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Royal Institute of British Architects.

INCORPORATED IN THE SEVENTH YEAR OF WILLIAM IV.

THE TRANSACTIONS.

SESSION 1879-80.

USUI CIVIUM, DECORI URBIUM.

LONDON:

PUBLISHED AT THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, 9, CONDUIT STREET, W.

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Royal Institute of British Architects.

INCORPORATED IN THE SEVENTH YEAR OF WILLIAM IV.

THE TRANSACTIONS 1879-80.

No. 1.

NO.	TITLE OF PAPER.	AUTHOR'S NAME.	DATE.
1	Opening Address	John Whichcord, F.S.A., <i>President</i>	Dec. 1st, 1879

SESSIONAL MEETINGS: MONDAY EVENINGS.

1879	DECEMBER	1*—15	1880	APRIL	5 —19
1880	JANUARY	12 —26		MAY	3†—24
	FEBRUARY	9 —23		JUNE	7§
	MARCH	8†			

* Opening Meeting.

† Special Meeting.

‡ Annual Meeting.

§ Presentation of Royal Gold Medal.

NOTICES of the PROCEEDINGS are published on the Thursday morning *following* each Sessional Meeting, and the current number of the TRANSACTIONS is published on the Thursday morning *preceding* each Sessional Meeting.

THE TRANSACTIONS.—The average price to the public of the Transactions is 1s. 6d. per number, and One Guinea per volume bound in paper covers. Members may obtain extra volumes of the TRANSACTIONS at the rate of 25 per cent. discount on application to the Secretaries, and for extra numbers (when in print) at a similar reduction; but when only a few volumes of a particular Session, or a few copies of a particular Paper, remain, as is now the case, such volumes or numbers will not be sold without a special order from the Council.

USUI CIVIUM, DECORI URBIIUM.

LONDON:

PUBLISHED AT THE ROYAL INSTITUTE OF BRITISH ARCHITECTS, 9, CONDUIT STREET, HANOVER SQUARE, W.

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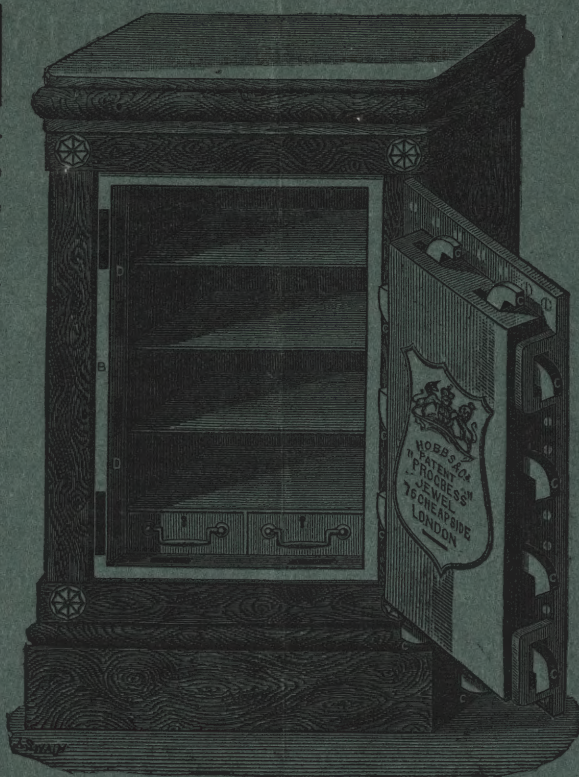
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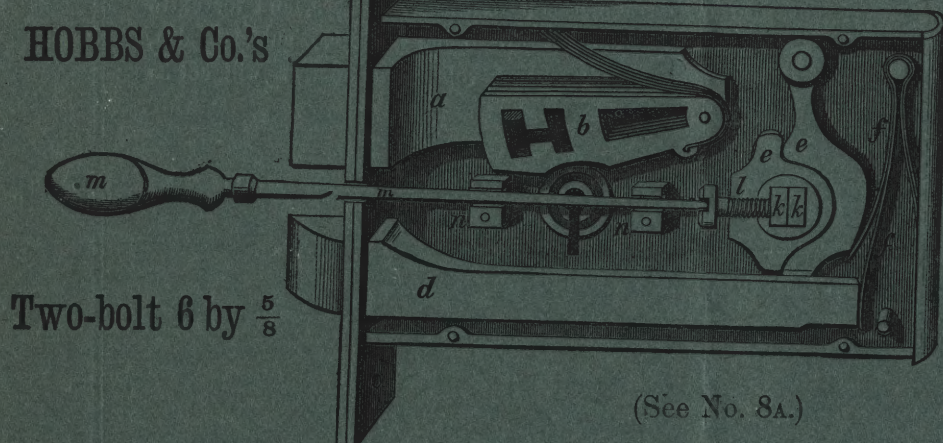
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Royal Institute of British Architects.

INCORPORATED IN THE SEVENTH YEAR OF WILLIAM IV.

SESSION 1879-80.

I. THE OPENING ADDRESS. BY JOHN WHICHCORD, F.S.A., *President*.

GENTLEMEN,—Turning back to the records of our twenty-sixth Session, I have found that, at the Opening Meeting held just twenty years ago in the new Rooms at 9, Conduit Street, Hanover Square, our first President expressed a certain pride and pleasure in presiding for the first time in a place where the British Architects might be said to have a *locus standi*. In a short account he then gave of the past he told us that the first Meeting he had attended was in King Street, Covent Garden, in the year 1835, when the Institute was in its second Session. Two years afterwards it removed to Grosvenor Street, where two different sets of apartments were occupied in succession. Coming here in 1859, the late Earl de Grey, my noble predecessor whose words I have quoted, delivered the Inauguration Address in this place just one month before his death. He had been our President for twenty-four years; and during that period the number of professional members had risen from 13 to 293. I am glad, therefore, at the close of another twenty years, to be permitted to welcome you within the same walls, but in rooms which I trust you will deem an improvement upon the old.

I am glad to record that in the course of those twenty years the number of Fellows and Associates has steadily increased from 293 to 681. I am glad also to welcome here this evening many of the same men who assisted a score of years ago at that Opening Meeting; to know that in this—the forty-sixth year of our existence—our founder, Professor Donaldson, is still diligently at work for the benefit and advancement of the Profession.

But as it has been the painful duty of my predecessors to deplore the loss of colleagues who have been taken from us, so it now falls to my lot to record the decease since we last met of a very old member, Mr. W. Southcotte Inman; others more or less publicly known are also deceased, and obituary notices of them will be published in the Appendix to the TRANSACTIONS of this Session. Three names, however, more prominent than the rest, and familiar to the professional ear, claim from your President more than a passing word. The death of Joseph Louis Duc, at Paris; of Eugène Emmanuel Viollet-le-Duc, at Lausanne; and of Edward Blore, in London, are events of more than general interest. They are episodes in architectural history. The enthusiasm, learning and ability which comparatively young men have witnessed in what is now called the Gothic Revival were not due to any sudden inspiration, nor were they rapid in their growth. The seed was sown towards the close of the last century; the pen preceded the pencil in successful attempts to interest the public with mediæval legend and antiquarian research. Edward Blore, who has just died at the age of eighty, is perhaps the last of that

generation of workers who fifty and more years ago were familiarising the nation with stories and sketches of the many native buildings, more or less decaying, scattered over this island,—ancestral works, which, then were neither appreciated nor understood. To him, a contemporary and fellow-worker with Pugin, may be partly attributed the change that has occurred, in this particular, among the majority of Englishmen. Sir Walter Scott, to whom a recent period of revival is more indebted than perhaps it is willing to own, may be called the patron of Edward Blore, whose earliest work of practical architecture was the front of Abbotsford House, over which, however, Sir Walter had probably no small influence and control. Blore, who was intrusted with the repair of several English and Scotch cathedrals, was ultimately appointed architect to King William IV., and afterwards to Her Majesty the Queen, having been employed both at Windsor Castle and Buckingham Palace. He also erected some well-known and important residences in different parts of the country; his drawings and etchings are extremely valuable, the books he illustrated numerous.

A heavy debt of gratitude is due from the brilliant writers and draughtsmen of the present time, in France, Germany and England, to the scholars and artists who, in a particular school of architecture and the allied arts, preceded them. Nevertheless, in an assembly like this, and with recollections fresh in our minds, the pre-eminence of Viollet-le-Duc over all other exponents of the artistic theories and precedents he illustrated must indisputably be acknowledged. Both in diagram and description he was unsurpassed. More, he used his natural power of logical deduction to explain methods of construction, or give a reason for forms of design, with strength and ability such as none of his predecessors had exhibited. That he did not write or draw for men of our profession alone is seen by his "History of a House," his "History of a Fortress," his "History of Human Habitations," and his works on Fortification. I am assured that all the illustrations to these and his other numerous publications were made by himself, generally drawn and shaded on the wood by his own hand; and when it is remembered how comprehensive and elaborate are the illustrations to the sixteen volumes comprising his two great Dictionaries, it is difficult to withhold astonishment or limit admiration. He began to sketch his native buildings early, and he had completed a large number of such drawings before the introduction of photography unhappily diminished the ardour of draughtsmen travelling in pursuit of practical example and archæological parallel. He extended the theory of those "true principles" of Architecture which Pugin had earlier made the basis of a creed; and it cannot be out of place, here, to acknowledge the obligation due to Viollet-le-Duc, a Frenchman, and to Augustus Welby Pugin, the son of a Frenchman, in the elucidation of mediæval methods and the classification of mediæval styles—a science in which this country did undoubtedly take the initiative. Viollet-le-Duc was also equally happy with pencil and pen in the delineation of Grecian and Roman remains. Nor in his devotion to a particular current of architectural idea was he oblivious of the source whence the stream flowed. To some of his colleagues whose practice lay in the adaptation of a mode of construction older than the thirteenth century he paid a just meed of admiration. The works of Neo-Greek design, conducted by M. Duc at the Palais de Justice, in Paris, were often alluded to with delight by M. Viollet-le-Duc, while the former never hesitated to admit the value to a classical architect of M. Viollet-le-Duc's mediæval researches. Both have received the Royal Gold Medal, and the visit paid to us in this room, in 1876, by M. Duc is still

fresh in our memories. At that time M. Duc had been thirty-six years architect to the Palais de Justice. The work had year by year progressed; as each new portion reached completion an old building was pulled down. Before his death he conversed in turn with the heads of the various trades employed in the buildings, and left definite instructions with each. During thirty-nine years almost everything—to a wooden bench or an iron bar—had been designed under his direction or with his own hand. In giving up his charge he must have felt the satisfaction with which the knowledge of duty done and hard work accomplished is happily accompanied. Nor can we fail to perceive and envy that artistic organisation which, in spite of revolution and war, is maintained by the Parisians, who never intrust even the repair of their public buildings—historical monuments they call them—to other than qualified members of our profession.

I am not, however, able to enter upon any minute comparison of the modes respectively adopted by the municipal authorities of Paris and London for the improvement and embellishment of the two great capitals. It would be rash to suggest and futile to hope that this enormous metropolis, entangled with every sort of legalized complication both of land and house, will ever present to living men anything like the metamorphosis that has been lately witnessed by less than a generation of Parisians. It is sometimes said that the Empire ruined France in order to rebuild her capital and adorn her chief cities. But throughout France the small towns and villages are prosperous; the large cities are continuing and completing vast improvements. The Republic has given to Paris a thoroughfare more splendid, and with greater rapidity, than had been known during the Second Empire. It is also said, and I believe with truth, that the great works we have seen executed in France have not "paid," as people in England understand the word; but at least the French are now relatively no poorer under the infliction. Do the improvements in this city and metropolis "pay" according to the English meaning of the term? Perhaps I may venture, as a man of business, to doubt whether a new thoroughfare can be a "paying" improvement when, as in the case of Victoria Street, Westminster, land on either side of it remains for years unsold and unlet. I have heard say that Northumberland Avenue will not turn out a "paying" improvement unless the land on either side of it be speedily let or sold. A comparatively long time has elapsed since the Metropolitan Board of Works submitted to the Council of the Institute any elevation of new buildings proposed for erection in that Avenue; and, as you know, the Board is bound so to submit such elevations. I find that, in the Board's last Annual Report to Parliament, the delay in letting this land is attributed to the general depression in business, and to the expensive character of the buildings required to be erected. But when it is remembered that in Northumberland Avenue the foundations to the new buildings must be unusually expensive, and that the restrictions as regards dominant rights of light encouraged by the present mischievous state of the law are numerous, it might have proved true economy to have put the ground-rents at a scale that would have attracted immediate investors. I cannot refrain from comparing the desolate condition of Northumberland Avenue, situated in the very heart of London, with the brilliant achievement of the Avenue de l'Opéra, carried out by our neighbours in the space of a few months, and at a time when the political and commercial conditions of their country were certainly not superior to our own; I regret also that many undoubted improvements, due to the in-all-other-respects wise action

of the Board, should have been executed without adequate regard to the architectural embellishment of the metropolis.

The responsibilities, duties and powers of the Metropolitan Board of Works are enormous, and they annually increase. It is not only important that the organization for devising and deciding the details of street improvements should be the best of the kind available, but it is also important that the machinery employed for purchasing, letting and selling the common property of the metropolitan ratepayers should be well put together. Now, both individually and collectively, we architects are in constant communication with the Metropolitan Board. The Institute has statutory relations with it and receives numerous acts of courtesy from it; its Superintending Architect is an honoured member of our Council, and its Chairman one of our distinguished class of Honorary Associates. We, as a corporate body, not only wish well to the Board, we would do whatever might lie in our power to aid it in the discharge of its manifold functions. Architects may be elected members of that Board, just as barristers, solicitors and doctors may be so elected. It would be ridiculous to say that professional men shall not sit at that Board because they may have had a pecuniary interest in some of its public business transactions. But I shall run no risk of censure when I say that a Fellow or an Associate of this Institute, if he be elected a member of the Metropolitan Board of Works, ought not from that moment to have any professional connection whatever with the purchase of land offered for sale or lease by the Board; nor should he be professionally engaged in the superintendence of buildings to be erected upon land which is the property of ratepayers, whose agent and representative he is.

The subject of "Illicit Commissions" has again been brought before the public, and a temperate letter to the *Times* from Sir Edmund Beckett, one of our Honorary Associates, recently afforded an admirable comment upon the present phase of the difficulty. Our course, as a corporate body, is clear; the declarations taken by our members were framed many years before it was discovered in the newspapers that a great deal of unrecognized dishonesty existed in almost every rank of the community. It is generally admitted that there are blacksheep in all folds; it was then laid down with a show of authority that in the architectural fold all the sheep are black. But time has brought its softening influence to bear upon our well-intentioned maligners; they have felt the impropriety of making against the whole profession a charge which could not be made with impunity against individuals. Two years ago the Council in their report, which was adopted by the Institute, declared themselves ready to co-operate with the Legislature, in order to prevent and exterminate what in an architect, who is the fiduciary agent of his employer, is neither more nor less than fraud. So far we are in the straight path. There is, however, one detail of architectural practice—often forced upon professional men who happen to be situated at a distance from the large provincial capitals—which offers to the outsider an easy handle of criticism. It lies in the mode of payment adopted for bills of quantities. In London and the chief cities these bills are prepared by specialists; and there is no absolute necessity for an architect to prepare bills of quantities for his own works. As a rule he does not take out the quantities, nor does he derive any pecuniary benefit from them; but when he does the declaration taken by both Fellows and Associates is sufficiently precise. The words in the case of a Fellow are;—"I will not take out quantities except for works to be

executed under my own superintendence, and then only with the concurrence of my client: such quantities being paid for by him;" and in the case of an Associate:—"I will not take out the quantities for works to be executed under my own superintendence, except with the concurrence of my client, and unless the said quantities are paid for by him." In making these quotations I hope that I may be considered to have the interests of our profession at heart, for my object is to inform outsiders of the obligations accepted by every one of our professional members, rather than to remind the members themselves of the discipline to which we all voluntarily submit.

That discipline is our chief safeguard; it was in the minds and hearts of those who founded this Institute. The tacit concurrence of the general body with recent attempts to advance the interests and secure the well-being of a profession, still young and still not fully recognized, is conspicuously apparent. I need hardly enlarge upon the sentiment with which the Council reciprocate the confidence reposed in them by the majority of the general body. Even in so small and what at first sight may seem so congenial a task as the improvement of the premises we have occupied for twenty years, that confidence has been appreciated as a favour and a necessity. You will possibly be incredulous when I tell you that the difficulty of making our rooms more convenient than they were before has been considerable. The difficulty was enhanced by the fact that the whole Council, upon whom the preliminary business depended, were one and all experts in the subject they had undertaken to discuss. When the original plans prepared by our Fellow, Mr. Phipps, were before us, there was a half-formed intention to take a lease of the upper floors of this building; a scheme was suggested by which our Meeting-room was to be placed on the second floor, the Library remaining in its present position. But even had we succeeded in inducing members to ascend more than seventy steps to reach the Meeting-room, the cost of such a scheme precluded the possibility of its execution. Mr. Phipps then made several supplementary designs, and gave the Council the benefit of much valuable assistance. But the purpose for which his services had been retained was set aside by the Institute as beyond the general wish or means. He was therefore good enough to accept the usual professional honorarium, and the Council took upon themselves collectively the task of devising some comparatively small alterations and renovation of the rooms we occupied. As you have already been informed, they ultimately appointed a Committee of four of their number to carry out the plans approved by the last Annual Meeting, together with the Resolution that empowered them to negotiate for the acquisition of additional area on the upper floors for purposes of ventilation. One of the members of this Building Committee was Mr. Macvicar Anderson, who, admitting the possible embarrassment of four architects engaged in the joint superintendence of building works, chivalrously consented to take charge of the matter, at the same time declining to accept any pecuniary compensation. His colleagues on the Council have expressed to Mr. Anderson their sincere thanks for the trouble and anxiety he must have incurred, and it remains for the Institute at some future time, when a report will be formally presented, to say whether we have been hasty in our judgment or wrong in our appreciation of much quiet service very gracefully rendered.

It is impossible to refer to the subject of these alterations without being reminded thereby that Mr. Charles Barry had, during his three years of office, a most natural desire to see the improvement of our rooms effected. He had devoted himself so entirely to the Institute,

that he must almost have felt it a reproach to leave this chair while the alterations remained to be done; and to know that they have now met with his approval is a satisfaction to us over whom he has presided with such good temper and such beneficial results. I am unable also to forget that his full and comprehensive address at the opening of last Session, together with the report of the Council issued last April, leave me little of the past upon which to expatiate. It is, however, gratifying for me to support and follow him in his opinion respecting the functions of our Committee on Professional Practice. Mr. Barry deprecated the custom of submitting to that Committee cases the statements of which are simply *ex parte*. The Members of a Committee cannot be made advocates in individual cases, for thereby they might subject themselves to be subpoenaed as witnesses; but when appealed to on points of principle they can conveniently and usefully formulate an opinion, which, when approved by the Council, is always willingly given to an applicant whether he be or be not a member of the Institute. Nevertheless, the paragraph in our last report, referring to differences or misunderstandings between members, offers to my mind the best solution. It is there suggested that an agreement should be previously made between the parties to leave the question in dispute to the decision of the Council, or of a Fellow nominated by them. Moreover, a Committee cannot, under the By-laws, give advice or speak in the name of the Institute. The Council appoint Committees to assist them in the investigation of specific subjects, and they are often very much indebted to members for the benefit of their assistance. But as all the affairs of the Institute are managed and directed by the Council, subject to the control of the General Meetings, no Committee has any power of separate or private action.

The reasonable conservation of ancient and mediæval monuments is a question too important to be ignored by architects, or omitted in your President's Address. That news of a reported restoration of the west front of St. Mark's Basilica at Venice should be received in this country with some dismay is natural and explicable. Nor have Englishmen any right to expect foreign nations to take a similar interest in the old churches and cathedrals of these islands. Even presuming it possible now to destroy or mutilate a mediæval building in Great Britain or Ireland the misfortune would not be felt by the Italians, because similar works of the same character abound throughout Western Europe; America might justly complain, Italy never. But there is only one Venice, and the history of our modern world begins with Rome. Hence the anxiety of Englishmen for the original works of Italian masters; hence their excuse for a protest which under other circumstances would have been impertinent. Indeed, after an uninterrupted experience of many years, thinking men in this country are beginning to appreciate the real meaning of what after all is a comparative novelty both in practice and phrase. You will remember that Viollet-le-Duc was very clear on this point, for in past times no people ever "restored" as the word is understood at present; neither the Latin nor the Norman-French contained any word equivalent to the modern term of restoration. The classical and mediæval architects pulled down, altered, added or rebuilt, as necessity dictated or authority required, and to this fact is largely due the multitudinous variety of architectural precedents. The substantial records of every known nation show architecture to have been, though artistically conservative, a progressive science. To attempt to maintain that every useful

building is to be left untouched if only it be old, and that every useless obstruction is to remain an obstruction if only it be beautiful, is a paradox opposed to the very principles upon which our forefathers constructed the self-same buildings that now delight the many and render a few enthusiastic people almost inconsistent. The architect is both an engineer and an archæologist. He must, as a rule when arrived at the three cross roads of the proverb, take the middle one; he is neither free to follow the engineer alone, nor the archæologist alone. He cannot, like the engineer, be "the first by whom the new is tried;" he must not, like the archæologist, be "the last to lay the old aside."

The inquiry, now being prosecuted, into the statistics of damage to buildings by electrical action is one of more importance than many have possibly imagined. Existing knowledge on the subject, even among men exclusively scientific, has long been admitted to be slight and imperfect. The Meteorological Society of Great Britain is therefore doing good service to both architects and engineers in collecting statistics with a view to the ultimate publication of a general code of rules for the construction and fixing of lightning rods. I believe that a great number of facts relating to actual damage and escape from the effects of lightning at home have been already obtained, and that further information on the subject has been promised from various parts of the world.

I have no doubt, when the different items of information are put together in a scientific manner, that we shall be enabled to publish in our PROCEEDINGS a synopsis of the same. And I would venture to make a few passing remarks upon the fact that we are now arranging in one annual volume everything having to do with the public business of the Institute. With this object our PROCEEDINGS or "Notice Papers" now comprise, in one uniform regularly-paged publication, reports of Council, balance-sheets, estimates, general notices, lists of members, lists of prizes, reports of speeches, and so on. I have urged that, in future, the many communications we receive from our Honorary and Corresponding Members shall be printed, if not *in extenso* at least in extract, in these PROCEEDINGS. It has also been decided to send, at the close of each Session, an annual volume to all our Honorary and Corresponding Members; so that starting from this Session every one of our 868 members, of all classes all over the world, will be in receipt of our publications. It is therefore most desirable that the character of the Papers read here, and that of the Discussions which follow them, should be worthy of the subjects it is our custom and privilege to examine—useful contributions to the half-art half-science that we practice and uphold. There is no lack of literary work offered or suggested to us; our want lies in the difficulty of obtaining practical expositions of current subjects connected with architecture. If I may follow the thought of my predecessor in one of his excellent addresses, it is of little use or interest for us here to be argued into a belief that one style is better than another, or even that one phase of æsthetic design is more delicate than others. A see-saw of rhetoric exists to prove the futility of such discussion. I would venture to say that Papers upon practical subjects—on the best system of combining materials in different situations, on the best results obtained from experience of iron and concrete or of building houses that will resist fire, on modes of construction adopted in other countries, on the application of steel, of terra cotta, of plasters and cements to modern habitations—are likely to be far more welcome to the majority

of members within our own circle, and far more useful to everybody outside it, than the most learned dissertation upon the mutability of fashion, or the wittiest homily on the perversion of taste. I trust that, among the Papers to be read here this Session, those of a scientific and practical character will predominate, if only to balance the apparent tendency of our day to depreciate the value of that scientific basis upon which the art of architecture is founded.

With the PROCEEDINGS, to which I have referred, it is determined for the future to issue notices and communications made by the Architects' Benevolent Society to its subscribers and donors. The President of the Charity is a Past President of the Institute—Mr. Wyatt—who is now good enough to give us, in the responsible post of Honorary Secretary, the advantage of his tact and experience. Moreover, our Secretary—Mr. White—has, since this time last year, undertaken to act as Honorary Secretary of the Architects' Benevolent Society, so that henceforward the business of the Charity will be conducted in the office of the Institute. A similar arrangement has long existed at the kindred Institution of Civil Engineers, where the Secretary—Mr. Forrest—is the Honorary Secretary of the Engineers' Benevolent Fund, and the Council of the Institution act as the Directors of the Charity. Such a combination has been attended with marked success. The maintenance by the Civil Engineers of their Charity offers a comparison by no means flattering to ourselves, for the Architects' Benevolent Society has never, I believe, received that support from the profession which it deserves. No one has urged its claims more earnestly than Mr. Wyatt, who, in his last address from this chair, appealed as much to the dictates of ordinary benevolence as to the claims of professional brotherhood on behalf of a Charity now more and more economically administered. The announcement he has made to-night as to the amount collected for the invested fund shows that the interest he has long taken in the Charity does not diminish. I most sincerely intreat those of our body who can afford aid, to give donations which will all be funded, and to press their thriving colleagues into the still meagre list of annual subscribers. Now that this room in which we are met to-night will be devoted during the day to purposes of reading and writing, our Council-room will be the proper place in which the active members of the Benevolent Society can best meet,—it being a rule that nothing shall interfere, even for an hour, to diminish the value and usefulness of our Library as a centre of reference and research,

The numerous volumes that now adorn its shelves have been obtained from the liberality of members and of authors foreign as well as native, among whom no one is to be remembered more thankfully than the late Sir William Tite. He devoted a large sum of money to remedy the want, which existed to about 1866, of the more expensive publications on architecture. Thanks to him, and to the opportunities which the Council later possessed through donations of money—enabling them to purchase rare books such as can scarcely be expected to be presented by individual members—only a few standard works of reference are now required to place this Library, as it should be, among the best of its class. But permit me, whilst remembering the more expensive works, to add a few words in favour of the smaller and perhaps ephemeral publications, even pamphlets, referring to architecture,—that class often deemed rubbish, if such a term can be applied to any production which, considered useful in its hour, is liable to be thrown aside and destroyed, but which once preserved in our Library, may some day give the historian a useful clue to an invention, a date, or an

incident. These numerous works, already contained in many volumes, take up little room, and to some they are not the least esteemed portion of the Library.

The "Dictionary of Architecture" must by this time be well known as a work of reference, and for its great scope of subject matter, embracing all that relates to architecture as an art and a science. It is on the high road to completion; the letter O is published, and the letter P greatly advanced. It has been noticed to me lately that in this work we shall have a nearly complete collection of the professional lives of deceased British Architects. This fact alone is a great result when it is remembered to our disadvantage that many States, and even many towns in Italy and France, have published the lives of their local artists, and that Spain has produced valuable volumes on the architects of its country. No other work has yet appeared in England which revises and continues, like the "Dictionary of Architecture," the interesting contributions of Virtue and Horace Walpole in the last century.

Perhaps I may be permitted to hint that the valuable collection of technical books and illustrations contained within these walls has not been sufficiently used or fully appreciated by the majority of our members. If that be so, it is possibly due to the hitherto uninviting character of this room, owing partly to the want of light, and partly to the absence of those accessories which, in the best clubs and in the British Museum Reading-room, render modern Libraries a most delightful resort. Indeed, this room in which we are now seated used, with its bare table and its rows of empty benches, to present daily an appearance of the most woebegone condition. In future it will be a general Reading-room; some of the benches will be removed to a place of storage, and the rest will be so arranged as to leave the centre of the room free for readers. As our meetings never exceed fifteen in the course of the Session, the task of removing and re-arranging the benches, chairs and tables will be slight, while the advantage of possessing every day in the Session accommodation for members who may wish to meet, or read or write, cannot be disputed. I trust that some of our non-metropolitan members will take an early opportunity of proving the utility of a central place of meeting, and that metropolitan members may soon have opportunities of conversing, here, with colleagues from different parts of the country, on the practicability of measures long in contemplation, and now under discussion by the Council.

I allude to the relation of the provincial and colonial Societies of our profession to this Institute, placed as it is in the capital city of the Empire, and being the chartered body of British Architects throughout the world. As you know, something has already been done towards eliciting the views of the different Architectural Societies in England and Scotland, but the results have not encouraged the Council to formulate a definite scheme by which a more intimate connexion than at present exists may be maintained. What minor negotiations have taken place have been effected by correspondence—a by no means satisfactory way of discussing complicated and delicate questions. I think that personal contact may enable the Council to learn the wishes of local professional bodies, and that personal influence may tend to assimilate their local rules and interests to those of the chartered body. In view of future more lasting arrangements, I would venture to suggest that each of the larger Societies might be asked to delegate one of their number and that smaller Societies situated in neighbouring localities might appoint a representative of two or more Societies. These gentlemen might, for

the purpose of discussing the possibility of closer union, take their places at our Council meetings on the same footing as Past Presidents and Past Vice-Presidents now sit at our board. We could at the same time revert to the old system and appoint in different provincial centres one of our Fellows as a local Honorary Secretary or representative of the Institute. Indeed, we have already done so in one corner of this vast Empire, having appointed my friend Mr. W. W. Wardell, *Fellow*, our representative at Sydney, in Australia; while at Melbourne Mr. W. Lloyd Tayler, *Fellow*, will act in a similar capacity, though subordinate to Mr. Wardell, who for more than twenty years was head of the Public Works Department there. These gentlemen have accepted the appointments in view of the International Exhibitions at Sydney and Melbourne held this year and the next. But the fact may be regarded as the renewal of a system which should be widely extended. I see no reason why, if our members be only willing, we should not have Honorary Secretaries, duly appointed or elected, in the different Presidencies of India, in New Zealand, in the Dominion of Canada, and in other places, just as we now have in Victoria and New South Wales. The advantage of possessing such representatives, men whose career is not only known, but who themselves are personally known to the Council and their colleagues in this country—whose advice, in cases where British Architects resident abroad are candidates for admission to our ranks, can be solicited with confidence—must be obvious to all. I think, therefore, that the next step in the matter of our relation to the numerous Societies of our profession, in the British Isles and abroad, should be the appointment of Local Honorary Secretaries, and this I propose to submit for the consideration of the Council at an early opportunity. Much has already been mooted respecting the affiliation of provincial Societies to the Institute, and it must be borne in mind that an intimate connexion with ourselves is really possible in the case of Societies whose by-laws are not framed “in opposition to the general scope, true intent and meaning” of the Charter under which we are incorporated. I know one Society—the Glasgow Institute of Architects—whose members are governed by rules and who accept obligations almost identical with our own. The Glasgow part of the profession is very worthily represented at our Council, and, considering the distance from London, Mr. Honeyman may be called a regular attendant. Like him, most of the members of the Glasgow Institute are Fellows of our body. Suppose the professional men of Glasgow were to make a little verbal alteration for the general good and as a wholesome example. Suppose, instead of being called the Glasgow Institute of Architects, they were asked to be known as the Glasgow section of the Royal Institute of British Architects. I cannot believe that our colleagues of Glasgow would think such an alteration derogatory to their position, or that in making the suggestion other than the most friendly intentions towards them would be manifested.

The necessity for union, however, will become apparent as the time approaches for the execution of our by-law (No. 14) which, if it is to have any practical effect at all, will compel every candidate for membership to pass the test of an examination. The terms of that by-law, which was agreed to in 1877, are that “All gentlemen engaged in the study or practice of civil architecture, before presenting themselves for election as Associates, shall, after May, 1882, be required to pass an examination before their election, according to a standard to be fixed from time to time by the Council.” The subject is now under inquiry at the hands of

a Special Committee, who will in due course present a report to the Council. Meanwhile, perhaps I may, as the Chairman of that Committee and as your President, refer to some of the difficulties which obstruct our path, and, arguing from what has been successfully done by other professional Societies in pursuit of the results to which we aspire, lay before you a rough sketch of what I think is not altogether impracticable.

In the first place, even if it were possible, it is not desirable to make our profession a close one. The Church, Law and Medicine are close professions; they are hedged in by barriers which have grown up from time to time, and which may be regarded as hereditarily and historically pertaining to those three professions. They have to do with the spiritual, the moral and the corporeal health of the community at large. The welfare, spiritual and moral, of men is not thought to be affected by architectural successes or failures, although buildings ignorantly and unscientifically put together are known to physically impair human life. As it has been laid down in this room by one of Her Majesty's Counsel,—Ruin by bad advice, or killing instead of curing, are rather more serious matters than the difference between good and bad architecture. When, however, the same eminent Counsel made that remark, he had but just challenged us with the question :—“What real measures do you take, collectively or individually, to secure that men calling themselves architects should know anything of architecture beyond what they pick up in the offices where they sit for a time, copying drawings and specifications?” That was at the end of 1874, and much beneficial advance has been made in the Institute since then. Though even at the present moment we could not give a satisfactory answer to the question, we are at least able to say not only that the necessity for making a practical response is felt to be more and more necessary, but that our improved position renders it more easy to do so now than it would have been five years ago. My feeling is that every candidate for Associateship should be required to obtain a certificate from Examiners appointed by the Institute, or that he should hold some qualification from a University, from the Royal Academy, the Science and Art Schools, or from other educational bodies, which qualification should serve to modify the terms of his examination. That once established, it would be easy to regulate a transfer from the Class of Associates to that of Fellows. Whether such a certificate should be given to all those who before May, 1882, have been duly elected Associates is a question for consideration, though it is one that can be decided by reference to similar precedents in other Societies, particularly to that of the Dentists, to whom I shall allude presently. It would be idle to disregard the probability that, for the first few years of a regime by which the test of an examination was made a condition of membership, there would be a falling off in the number of new Associates,—and during the last Session 43 have been elected. This Session I anticipate a larger number; and during the period, anterior to the proposed compulsory examination in May, 1882, there would be, comparatively, a very large accession of Associates. Then would come the expected diminution of income from our subscriptions, and the question will arise :—Are we prepared to face such an eventuality? I, personally, think we are. Indeed, I think we are bound to face the difficulties of this matter, bound to try our strength. For if you look around, you will find bodies of men, far less favoured than ourselves, devoting considerable time and labour, and incurring a large expenditure, in pursuit of this very object.

Take the Institute of Accountants, quite a young body of professional men who have

lately introduced a Bill into Parliament to incorporate themselves with other kindred Societies for the purpose of regulating and controlling the profession of Accountant under the direct sanction of the Legislature. The Bill was read a second time in the House of Lords, and referred to a Select Committee. There was every prospect of the Bill passing, when at the last moment Lord Redesdale, the Chairman of Committees, suggested that in his opinion the object of the Bill would be attained by means of a royal charter, rather than by an Act of Parliament. The Council of the Institute of Accountants therefore presented a petition to the Privy Council, and were subsequently requested to forward a draft of their proposed charter. I need hardly add that the Accountants propose under their charter to make examination a condition of membership. Under their rules and regulations, "Every articled clerk who has made application for his name to be entered as a student shall before his name is so entered undergo a preliminary examination in regard to his general education," but any articled clerk who has matriculated at one of the Universities, or who has passed the Oxford or Cambridge Local Examination, or the Examination of the College of Preceptors, is not required to pass the preliminary examination. Then again, the rule of the Accountants is that every articled clerk who is a candidate for Associateship must pass an examination, and if he fail he may present himself again for examination, provided he do so within a period of six months. I have no doubt, should the Accountants get their charter, that they will afterwards apply for an Act of Parliament, and that they have both the spirit and the means to make the trial. Now, though we have had a royal charter for more than forty years, I do not perceive that we are as far advanced in this matter as the Accountants.

But there is another Society founded in 1848,—the Institute of Actuaries,—the members of which, though they do not possess a royal charter, submit to examination. That is to say, the Institute of Actuaries examines its own members. Candidates must be elected Associates before they are eligible to be examined; then after passing three examinations, and obtaining a certificate of competency, an Associate of the Institute of Actuaries requests to be made a Fellow. This proceeding seems a very stringent one, but I am told that the Institute of Actuaries is a flourishing Society, and that no one stands a chance of being known as a qualified actuary unless he be a Fellow of their Institute, a position of which the Fellows are justly proud.

Some of you, however, may think that it is now too late in the day for us to make examination a condition of membership; we are already too numerous. It would be impossible to force examination upon actual members; it would be unfair to compel candidates for admission to undergo a test that the majority of their colleagues have escaped. But do you know, gentlemen, that the Dentists have lately faced this difficulty and overcome it? Last year, on the 22nd July, an Act of Parliament was passed "to amend the Law relating to Dental Practitioners." It is now unlawful for any person to take or use the title of "dentist" or "dental practitioner" unless he is registered under the Dentists Act; and unless he is so registered he cannot recover in any court fees for any dental attendance or advice. A register is now kept, which contains (1) a list of all United Kingdom dentists registered under the Act, (2) a list of all colonial dentists registered under the Act, and (3) a list of such foreign dentists as are registered under the Act. The 18th clause of the Act refers to Examinations, which are held by the Medical Authorities having power to grant surgical degrees; these

Examinations are made a test of the fitness of persons to practise dentistry or dental surgery. Now, as the Chairman of the Special Committee engaged in collecting information necessary to guide our action in this matter of compulsory examination, I have learnt something about the working of the Dentists Act, not in so huge a place as London but in Dublin. Our Fellow, Mr. Thomas Drew, who was recommended to you this year for a seat on the Council, has been good enough to study the working of the Dentists Act in the Irish capital. I shall betray no confidence if I quote from one of his letters to us. His words are:—

“I have observed that under the reasonable and undeterrent kind of examination carried on by the College of Surgeons of Ireland there has been no difficulty in bringing in, within one year, the great majority of a body of practitioners hitherto requiring no legal qualification and consisting of men, many comparatively advanced in years and of long standing, to obtain the necessary qualification for registration. . . . The course pursued seems to owe its success to the wise discretionary powers conceded to the Examiners, the reasonable elasticity and absence of hard and fast lines of formality with which they have exercised them. The Examiners appear to have laid down no theoretic curriculum—to have set no ‘papers’ which would require a candidate of mature years to return to the half-forgotten exercises of youth. They have taken the candidates, then and there, red-handed from their practice, and, by an encouraging *viva voce* communication with each, elicited to their satisfaction whether the candidate was fairly and intelligently acquainted with his profession. . . . I have heard from some of the Examiners—men of great experience as surgical examiners—that they have passed their candidates with greater confidence in having ascertained the real value of their knowledge than by any examination by papers or otherwise in a set course. So far as I know, this is the first case in which a profession has been brought under the recognition of law by a happily hit-off combination of voluntary and compulsory examination. I cannot but believe that on some such lines it will yet be possible to bring architects within the pale of legal registration.”

Having learnt so much, we asked Mr. Drew to place himself, on our behalf, in communication with some of the Examiners of the Royal College of Surgeons of Ireland first appointed under the Dentists Act. He did so, and thanks to the kindness of Mr. R. Theodore Stack, F.R.C.S.I., one of the Examiners resident in Dublin, he has been enabled to furnish us with a most clear and satisfactory statement respecting the character and extraordinary success of those examinations. It appears that for the first year after the passing of the Act all *bonâ fide* practising dentists were allowed to go upon the register, but since last August the only portal to that register has been by obtaining a certificate from some of the medical bodies. Up to the 1st of August, 1881, the examinations will be of a *sine curriculo* character, for the purpose of meeting the case of the established practitioner, from whom only two conditions are required. One is that he has been five years in practice; the other that he has conducted his practice reputably. The dental practitioners in Dublin have evinced great alacrity to present themselves for the *sine curriculo* examination, and I am assured that the majority of the rejected candidates were very young men.

Now it appears to me that the question which may divide the Institute is not whether there shall or shall not be introduced the test of compulsory examination, but rather:—What shall be the character of such compulsory examination? Ought it to test the general education of a candidate, or should it be strictly professional in its details? The real difficulty lies in deciding upon the artistic capacity of a candidate. An idea doubtless prevails—and it may have great sway—that no Board of Examiners can possibly pronounce an opinion which

shall be conclusive on the artistic powers of a candidate ; or, to put it still more unfavourably, on taste partly natural and partly acquired. I will not here attempt to enlarge upon that quality which is known as good or bad taste—as to whether taste is a divine gift, an hereditary acquisition, or merely the result of association and education. But I am prepared to maintain that both geometrical and free-hand drawing are essential requirements for an architect. He may not, in the full tide of business, have either the time or the inclination to make or finish drawings, but he should at any rate know how to do so, if only for the proper exercise of his judgment and the due instruction of his pupils and assistants. I am also prepared to maintain that an architect should be cognizant of the general principles of construction, and that it is possible to define what those principles are ; and that he should be acquainted with the nature, qualities and value of those building materials that are in constant use in the localities with which he is or has been familiar. The question whether a student who has learnt the rudiments of architecture in Dublin shall be compelled to come to London in order to pass an examination fitting him to be enrolled in the list of British Architects is easily answered. Dublin has an old and a recognized Society of Architects. A student in Cork or Galway would repair to Dublin, where Examiners duly qualified and duly appointed would be ready to examine him. In like manner local examinations, under the control of our Council, aided by our Honorary Representatives, would, in different parts of the country, obviate difficulties and moderate abuses sometimes produced by over-wrought centralisation. Even in India and Australia similar opportunities might be offered to candidates for membership of this Institute ; and the very difficulties of compulsory examination might thus help to bind heterogeneous off-shoots from the parent stem in one solid and enduring Corporation.

Though I have perhaps wearied you with details of this character, I feel that the subject is too important to allow me to apologize for having introduced it. True, there are both at home and abroad hosts of things to which I ought to have fully alluded in this address. I might have told you of recent correspondence with our Foreign Members, whose letters in reply have frequently been accompanied with donations of valuable books and photographs ; I might have reviewed the labours of our member, Dr. Schliemann, among the ruins of Troy and the heroic tombs, or the recent festival at Pompeii to commemorate the eighteenth centenary of its destruction. At home, the probable completion of St. Paul's, and the improvements effected around the cathedral ; the projected thoroughfares in the City connected with the works of the Inner Circle Railway ; the relics of old London day by day disappearing ; the admirable address of the accomplished President of the Royal Academy at its last banquet ; the new Offices and Courts of Justice, a portion of which is now occupied ; the new buildings in the Temple ; the Natural History Museum at South Kensington ; the undoubted progress visible in the architecture of country residences, and even of suburban villas,—all these might have afforded material for chapters of comment or praise. If I do not devote an exclusive paragraph to sanitary matters it is not because I ignore the growing popularity of the science. It is only natural that architects should be credited with much of the acknowledged error which is due partly to general ignorance of the subject. But if the public are now on the alert it is because engineers and architects—notably one of our own Past Vice-Presidents—have for long years aroused attention to existing evils while prosecuting a systematic

inquiry into the methods of sanitary reform ; and your President and Council are keenly alive to the value of such independent professional research in a branch of science now somewhat involved by the speculative genius of numerous patentees. With regard to another subject discussed here during the last Session, I think, or at least I hope, that all London will soon have reason to thank Parliament for a recent Act which has amended a part of the Artizans and Labourers Dwellings Act, and removed the difficulty experienced by the Metropolitan Board of Works in carrying out the provisions of that Act. You will remember that the original Act of 1875 compelled the promoters of an improvement scheme to provide for the accommodation, on the same area, of all those persons of the working class inhabiting that area and displaced by that improvement scheme. Thereby, among all the expropriated inhabitants, the working class appeared to be the only privileged class. The amended Act provides that, where the confirming authority is satisfied that equally convenient accommodation for the working class displaced can be provided in the vicinity, and that the required accommodation has been or is about to be provided, an improvement scheme may be forthwith executed. The authorities can, under the amended Act, use land belonging to them for the purpose of providing accommodation for those of the working class displaced by a scheme of improvement, or they may purchase land elsewhere. The amended Act also contains provisions for assessing, in the case of future schemes, the compensation payable for premises within an unhealthy area. These amendments to the Act of 1875 are satisfactory proofs that the Legislature have recognized the difficulties which impeded the action of the Metropolitan Board of Works in the clearing of contaminated neighbourhoods.

I have but a few more words to say, and they relate to myself. I have to thank you, gentlemen, for having placed me in this chair—a position to the attainment of which nothing in my career has pointed or induced me to expect. But now that I am here, I desire to be proved worthy of being not only a leader but your leader. I cannot hope to preside over a Session as brilliant as that you have just enjoyed under the auspices of my immediate predecessor ; you must accept for the time being the services of a practical President. Four years hence we shall enter upon the fiftieth year of our foundation ; meanwhile there is time to establish the principle of educational fitness and assert the privilege of a liberal profession. Should I be fortunate enough to enjoy the confidence of the Institute during the usual period of Presidential office, I hope to show that the close union of British Architects throughout the world, facilitated by the accepted test of a compulsory examination, is both a possible necessity and a probable fact.



THE VOTE OF THANKS.

JOHN FOWLER, F.G.S., M.Inst.C.E., *Hon. Associate*.—Gentlemen, I have this evening the pleasant and congenial duty intrusted to me of moving a vote of thanks to our worthy President for the excellent address that he has just read to us. Having now had experience at the sister institution for many years with presidential inaugural addresses, I feel I may venture to express the opinion that the address which we have just heard is one of peculiar value from its scientific and practical character. I feel my privilege here this evening the more because our President has enforced, in no doubtful terms, the importance of including in future Papers to be read in this Institute the subjects of science and practice. These are subjects which belong to the engineer as much as, or perhaps it may be even more than, to the architect; but they are essential to both. The time and the circumstances are past when a man can be great as an engineer and great as an architect, as were the few old Italian giants; but the time is not and never will be when a man can be a good architect without some knowledge of engineering, or when he can be a good engineer without some knowledge of architecture. In point of fact the two professions overlap; to overlap does not mean *collision*, it means the reverse—it means union and strength. Just take the case of an architect called upon to report on a dangerous structure, or a structure alleged to be dangerous; why, it is simply impossible that a man can satisfactorily perform such a duty, unless he has a knowledge of strains and the strength of materials, and here is one of the many cases of inevitable overlap. Now, gentlemen, I rejoice very much that our President has alluded to St. Mark's, Venice, because it is one of the works of international interest. I wish at the same time it could be, like many other works of the kind, under international protection, so that all civilised countries might have an opportunity of assisting in its preservation. Probably our Italian friends who are, as regards engineers, to my certain knowledge as highly distinguished as their architects are, to your knowledge, equally distinguished, might be induced to take the initiative. I think such a proposal to them would be of immense weight, if they could see their way to mature a plan which would combine international assistance with the undiminished authority of the legitimate custodians. On the question of principle all must be agreed that the great and historic monuments of the world should not be allowed to decay and become destroyed. At the same time they should be touched with a gentle and loving hand; on that there can be no question whatever. There is one point, however, to which I shall venture to refer on behalf of those who, like myself, have no longer the same steady steps as in days of old. I venture to express the hope that, with due deference to the probable intentions of early architects, and with due respect to æsthetic propriety, you will, when possible, make level pavements rather than wavy ones. Permit me to congratulate you in regard to the three Royal Honorary Fellows whose names have been announced this evening, and, although not formally elected, we may safely assume their elections as being a matter of form. Believe me you have done wisely and well to induce these Royal personages to become associated with us. At the Institution of Civil Engineers we have reason to be proud of His Royal Highness the Prince of Wales, and I can

assure you not only does he grace our annual dinners, when his numerous engagements permit, with the dignity of a Prince and the geniality of an English gentleman, but he never omits an opportunity of showing his appreciation of our works and our pursuits. These Royal personages now belong to yourselves, and they will have opportunities of evincing their interest in your noble profession, which without that connection they could not have had; and I assure you my congratulations are serious and earnest congratulations on the steps you have taken in reference to them. Permit me now formally to move a vote of thanks to your worthy President for the address which he has read to us.

GEORGE GODWIN, F.R.S., *Past Vice-President*.—Mr. President and Gentlemen, I assure you I feel it a great compliment to have been called upon to second the vote of thanks on this occasion. If I have not heard, I have read the whole of the addresses which have been delivered at the opening meetings of the Institute of British Architects; and I venture to say that a more practical and at the same time more eloquent address was never delivered by a President of this Institute. At the commencement it refers to Earl de Grey and the room in King Street; but that will bring to scarcely anybody in this room the recollections which now flow upon me—I am afraid to no one in this room. I see there so many men who have passed away: the elder Hardwick, Cockerell, Goldicutt, Scoles, J. B. Papworth, the elder Fowler, and half a dozen others. I have reason to recollect that room; for it was my good fortune there, over the now historic Evans's, to receive from Earl de Grey, as the representative of the Institute, a most gratifying tribute. Fortunately we have still left to us one of the founders who was there—our dear and valued friend, Professor Donaldson, whose absence to-night I greatly regret. I think, under almost any circumstances, he should have endeavoured to be here to receive from us that homage and affection which we are all ready to pay him. In the same frame of mind which that reference to King Street has produced, I could have wished that when the names of Pugin and Edward Blore were mentioned, as having led so materially to the love of ancient buildings and to the knowledge of them in this country, the name of John Britton had been recollected. He was a good friend of mine, and a good friend of all architects and archæologists of the present day—a man emerging from a cellar in Clerkenwell, where he was occupied for years in bottling wine, and coming forth into the world with little or no education except what he had given himself, and yet able to leave behind him a series of volumes of the greatest value and beauty. In producing those volumes he founded a school of architectural draughtsmen and engravers which certainly cannot be equalled in the present day. It was in the prosecution of those works, and in aiding him in some of them, that Edward Blore was led to lend his wonderfully facile and fairy-like pencil to the portrayal of works of this kind; therefore I should have been glad if John Britton's name, which must be held in respect by all, had been mentioned. I had jotted down a few observations, but the hour is so late that I fear to enter upon them. I am glad our President was bold enough to give a hint to members of the Metropolitan Board of Works who may be also members of this body. It is not that any fear is entertained that they would do that which would disgrace themselves in either position, but architects should be not only *sans reproche*, but *sans peur*; therefore I am glad the President has taken the opportunity of making the suggestions he has thrown out on this subject. Then there is the matter of illicit commissions. Many are the wild statements made against architects; but it

happens to me to hear more from architects and more about architects than any man in this kingdom. I do not hesitate to say, and at the same time to aver, that, as the result of very considerable personal experience, a more honourable, a more high-minded, I may say a more chivalrous set of men it is impossible to find. I have endeavoured to fix those who have made the charges to some specific statement, but have always failed to do so. It would be difficult for manufacturers and others to make a specific statement; but if there had been any grounds for such wide-spread charges, I should most probably in one instance have been able to arrive at a specific charge; but I never have. As to bills of quantities, the President has reminded you that a Fellow may take out the quantities for work carried out under his own superintendence; but the architect is wiser who resists the temptation to do that which possible financial advantages might lead him to undertake. I speak from knowledge: it is nearly certain to lead him into a false position with the builder, and should on all accounts be avoided. With respect to the building we are now assembled in, my first feeling is that of thankfulness that we did not carry out the proposition to go up to the "two-pair." We are obliged to Mr. Macvicar Anderson and the other gentlemen who superintended the work, but I am afraid this is not final. With so many members absent, and so many now standing about, I think we must look out for fresh subscriptions, and ultimately provide a new building for ourselves, a fitting meeting-place of what I trust will be soon the great body of British Architects, because, as we have heard, the question of affiliation of other societies has yet to be discussed, and must ultimately lead to some such result. The question of restoration has been touched upon gently, but wisely. On this subject again statements are made which can only harass architects, and lead to a disregard of our ancient buildings—permitting them to fall into ruin rather than preventing damage. A building surely must first be useful, it must afterwards be beautiful. The aim of those who have the care of monumental heirlooms should be to give such protection and repair to the building as will prevent its falling into ruin before it is too late; but when a building falling into decay is committed to an architect his duty, his office is to fit it for its purpose. The question of Restoration has produced, I think, a little too loud a cry—even in the case of St. Mark's; and the restoration of St. Mark's is a subject I would approach tenderly. My own feeling goes with those who exhort the Italians to take care of that most interesting building, but I believe they never intended to do so much as they have been given credit for. They intended to confine their operations to portions of the western façade, which I understand are in a most dangerous state and I know, not only from the letter read to-night but from other sources, that the Italian government has paid more attention to the Italian architects in this matter than our own government would probably have done to English architects in a similar case. That is an admirable step which has been taken with regard to doing the work of the Architectural Benevolent Society in connection with the Institute. The fund will of course be kept separate from the funds of the Institute, but will be worked in this building, and that I look upon as an admirable step. It is so in the Institution of Civil Engineers, the Royal Society, and in other Societies, and I am glad it is to be done here. Then again I regard as a very excellent proposition the appointment of Honorary Secretaries throughout the world. In another Society with which I am connected—the Art Union of London—this course has been the root of its wide success, and I hope it will be prosecuted here. Touching compulsory

examinations, I confess I have never looked favourably upon any plan which proposed to make architecture a close profession. I think no man should be prevented from designing or carrying out a building any more than a painter should be prevented from selling a picture, or a sculptor a statue, without a diploma from the Royal Academy; but for the Members of this Institute to say we will not admit any person to take that position in the eyes of the world, which admission to the Institute would give him, without showing his fitness for it, is an entirely different thing, and is a very proper step to take. It is to be hoped it will be carried out as proposed, and that in 1882 an Examination shall be necessary for those who are admitted Associates of the Institute. I will only make reference to one other point, and that is the allusion made by the President to the sanitary question. It would be affectation on my part if I pretended not to see that some labours of my own have been most kindly mentioned in the address. In many cases in the building of houses the greatest ignorance and culpable neglect of sanitary considerations is still shown; but these are not often the work of architects. There is every reason to believe that architects, as a rule, do endeavour to make such provisions as are necessary; and it should never be forgotten in speaking of this movement that the late Mr. Henry Roberts laboured for many years in advancing it. The efforts of Mr. Robert Rawlinson are known world-wide; and those of Mr. Baldwin Latham are conspicuous. Then again Mr. Norman Shaw, the Academician, and other architects are giving special attention to this subject, and no doubt the necessity of that attention will be more and more felt. I have only now to say that I second with very great pleasure indeed this vote of thanks. I have known Mr. Whichcord for many years, even before he became the partner of that most excellent friend of ours, the late Mr. Ashpitel, and I have watched his progress, and augur great success to the Institute under his rule.

The vote of thanks, having been put by Mr. John Fowler, was carried by acclamation.

The PRESIDENT.—Gentlemen, I shall certainly not inflict a speech on you at this late hour of the evening. I cordially and sincerely thank Mr. John Fowler and Mr. Godwin for the very kind words they have said. I could have commented for a few minutes on the suggestive remarks they have made this evening, but I feel that I should trespass on your patience, and in the next place I feel a difficulty with my voice.



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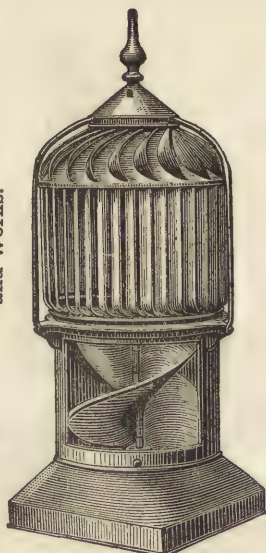
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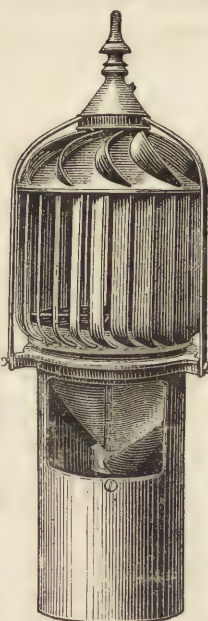
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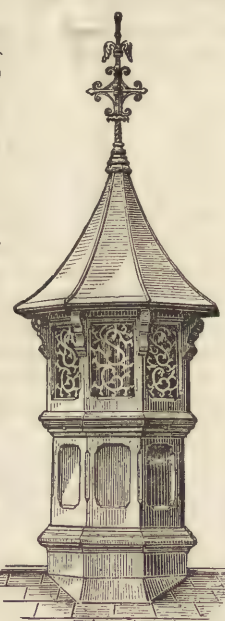
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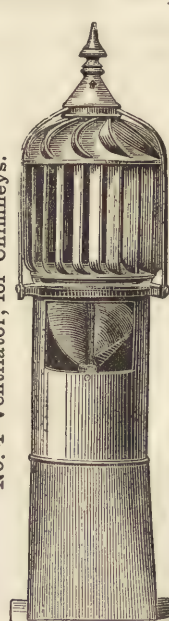
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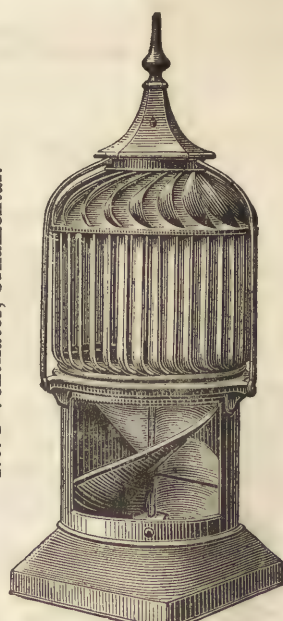
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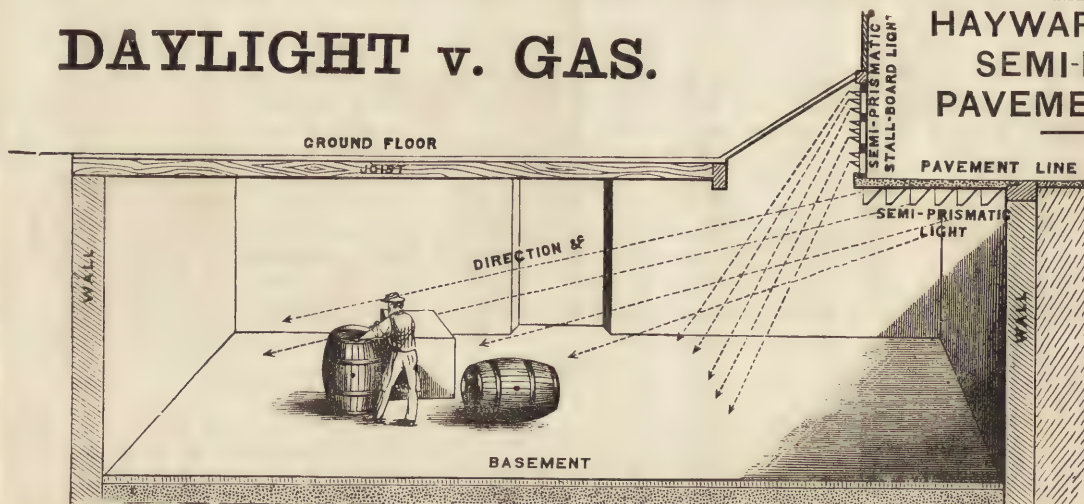
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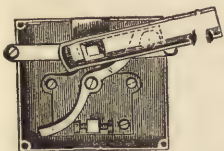
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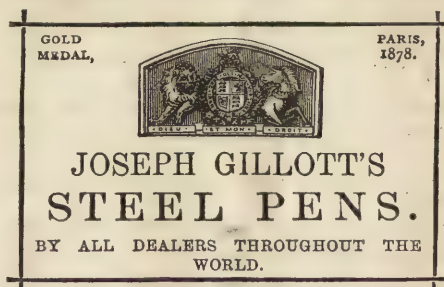
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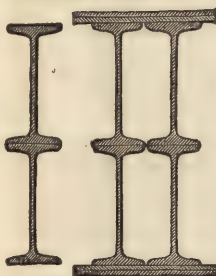
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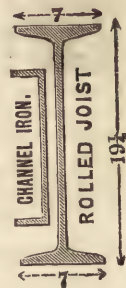


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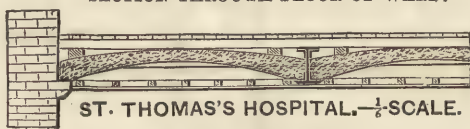
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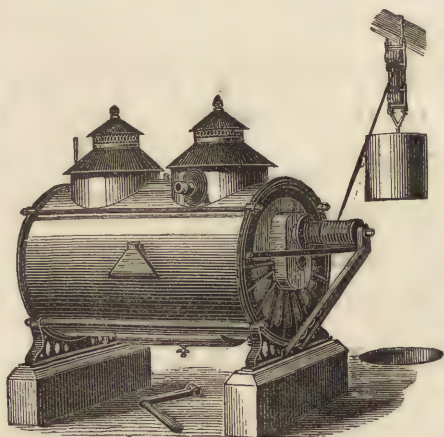
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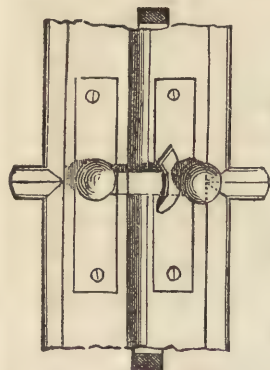
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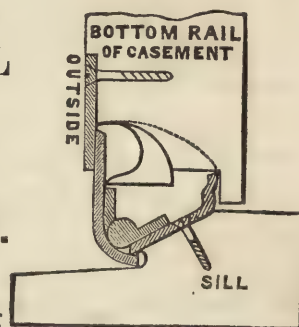
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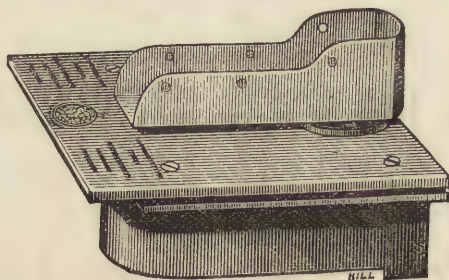
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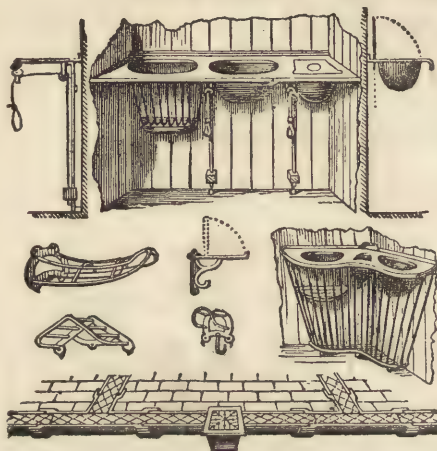
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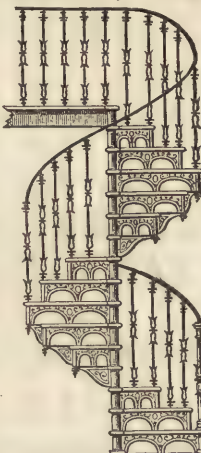
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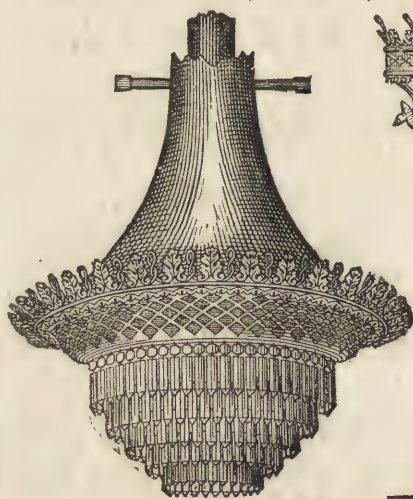
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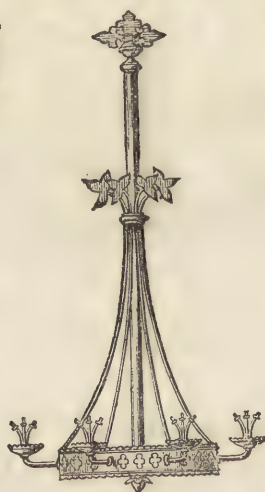
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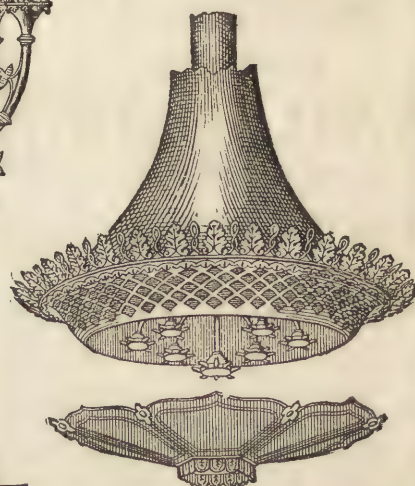
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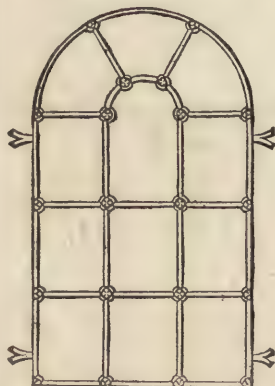
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Affords Ventilation with security when the Window is opened at the top or bottom.

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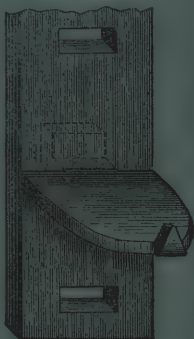
WETHERED'S PATENT SELF-FASTENING BLIND FURNITURE.

Suitable for all kinds of—especially Venetian—blinds which are worked by lines. Is simple in construction and perfect in action. The blind is raised or lowered by holding the line or lines out of the vertical line, when, in consequence of the moveable roller immediately falling to the bottom of the slot, the lines become free to move up or down until released, when, falling vertically, the friction causes the moveable roller to be drawn up towards the fixed roller, and automatically clamp them.



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Are intended to replace the troublesome studs by which book or other shelves have been usually regulated. The perforated metal strips are let in and screwed to the upright frames. The plates, although sufficiently strong to support the heaviest books, are so thin as not to require to be mortised into the shelves, and by the facility with which the plates are inserted, a fine adjustment can be given to the shelves without an irritating waste of time.



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II. FREDERICK PEPYS COCKERELL: A MEMORIAL SKETCH.

IN the cemetery of Auteuil near Paris, on a sad November day, was laid to rest all that is mortal of one who has left specially to the Guild of British Architects the legacy of a most honoured name. An allusion in the Presidential Address of last Session, to a loss then so recently sustained, touched the heartfelt sympathies of the audience by appeal to the mute eloquence of an empty chair. With what grace the functions of Honorary Secretary were discharged by Frederick Pepys Cockerell is unanimously acknowledged no less by those whom he represented than by the artists of foreign nationality whose interest he was successful in associating with our own English aims and work. His skill as a linguist in the expression of his own genial and appreciative mind made him a true exponent of those fraternal sentiments by which British Architects are assuredly actuated towards their foreign friends and colleagues.

When summoned from a life bright in social and professional success, rich in the promise of future distinction, he was on a visit in Paris, spending his days in the Exhibition Buildings and a welcome guest at the tables of distinguished professional colleagues. On the 4th of November, 1878, friends assembled to do him honour at the house of M. Duc—whose own decease occurred only a few months afterwards—were shocked to learn that their last words with him had been an unknown farewell. Death had been immediate upon a sudden seizure that day. At his grave side a tribute of respectful sorrow from those Frenchmen whose work he had ever warmly appreciated and whose intercourse had brightened the closing hours of his life was feelingly paid. M. Hardy (*Architecte de l'Exposition Universelle*), M. Vaudremer (*Architecte de la Ville*), M. Pellechet, all three comrades of his youthful travel and study, and MM. Duc and Lefuel, were there; as well as M. Daumet, whose beautiful drawings for the Duke d'Aumale's château at Chantilly had been the theme of admiration in the very last letter which was gladdening home, when the dark message came that its writer could never return.

A desire having been expressed that a biographical sketch of the late Honorary Secretary should take its place among the records and papers of the Institute, it is well that the task should be performed while its difficulty can be appreciated, and the deficiencies of the portraiture inseparable from its subject can be supplied by the loving recollection of his professional contemporaries. No succession of great public works executed by him arrests attention, compelling admiration or challenging criticism; yet, who is there among the most distinguished in architecture who does not feel the loss which was sustained in his death? As an artist he will be remembered—as a man of delicate taste and fine perception, of generous impulse and catholic liberality, which, harmonizing the intellectual with high moral qualities, formed a character of rare attractiveness not easily conveyed to the minds of any who were strangers to its refining influence.

Frederick Pepys Cockerell, born in 1833, was the second surviving son of Charles Robert Cockerell, R.A., and Anna Maria his wife, daughter of the engineer John Rennie. At that time no name was more illustrious than his father's in the society which awards honour to artistic genius. Some sentiment of romance, moreover, always affected the minds of

many friends towards the man who for years of early youth, though gifted with every grace of presence and every social charm which could fit him to shine in cities, had devoted himself with a rare singleness and courage of ambition to the exploration and study of buried sculptures and gems of architecture cruelly maltreated,—reckless of the peril which in those days besets the traveller in continental Greece, and still more him who committed himself to the yet ruder life of her island population. Shortly after he was appointed to the Professorship of Architecture in the Royal Academy his interest in the reputed works of William of Wykeham led the elder Cockerell frequently to visit Winchester College, and there he placed his son Frederick as a commoner in the year 1845. Winchester was at that time a very rough school. The authorized despotism of the sixth form, and too much unauthorized self-assertion of the stronger over the weaker, formed, however, a discipline not wholly disadvantageous to such of the new comers as were gifted with courage and temper. Old Wykehamists of his own standing, and many who at his coming were high in the school, remember Cockerell a bright-faced curly-headed boy, who, while never subjecting himself to the severe punishment which awaited rebels against constituted authority, always managed by intuitive tact and good humour to disarm the terrors of the bully. Sufficient that he won his way rapidly to popularity and the full enjoyment of a school life to which he always looked back with pleasure and affection. Already, in so early boyhood, his father seems to have discerned and appreciated in him some germs of an æsthetic tendency. A little entry in Mr. Cockerell's diary during his son's first holidays is touching when read in the light of after events: "June 28, 1845. With my boys to the Academy Exhibition; judgment and taste in Fred; more combativeness in Robert." The one was to be the friend whose loss is now deplored; the other, who set his heart upon a soldier's career, fell gallantly in his twentieth year as a lieutenant in the Royal Artillery at the memorable battle of the Alma.

Meanwhile the Winchester curriculum of that date gave no encouragement to the acquirement even of the rudiments of art or science. There, proficiency in the mechanism of Latin verse was the special avenue to distinction, and it does not appear that, in this, young Cockerell achieved any marked success. The bent of his disposition was rather shown in the collection of little drawings, fruits of feeble tuition, which he treasured as memorials of the school friends whose names they bore. At the close of 1848 he matriculated at King's College, London, and the reason for this so early change in his course of studies may probably be found in the name of the department to which he was attached, viz., "Applied Science," with all the branches of which his father, clearly destining him to the profession of architecture, desired that he should now begin to be conversant. For about five or six terms he is recorded in the College books as constantly attending the lectures, during which time his fellow students were more impressed by his presence, vivacity and cleverness of conversation, than by any apparent devotion to severe study. One who sat next to him at Professor O'Brien's lectures on natural philosophy remembers Cockerell's note-book as being fuller of deftly traced towers, pinnacles and spires, than of the teaching which its pages were intended to record. He was observed to affect much the companionship of the medical students, with whom as an "occasional" he attended the anatomy classes. Familiar, doubtless, with a favourite theory of Professor Cockerell that the human frame is the basis of all idea of beauty, he set himself with interest to a study which must always be the foundation of correctness in figure drawing. It bore fruit

in the facility which he afterwards enjoyed of thorough truthfulness in the expression of an instinctively delicate sense of form. In designing decorations he would outline a figure, two feet high from head to foot and up the other side, without taking his pencil from the paper. This dexterity was no less edifying to those who witnessed his office work than amusing in general society when, to illustrate some point in conversation or to describe a scene, a minute or two with a pocket pencil on a letter-back would suffice for a most artistic representation of form and action. It happened one day in 1851 that a student at the old School of Design in Somerset House, now a successful painter, observed a youth whose appearance struck him, but whose name he did not know, to be diligently working at the remains of an antique statue—the legs of a Faun. Hearing that he was an architectural student, the young painter commenced an acquaintance with him by expressing surprise at the then unusual devotion of time to this line of study by one whose professional intention was thus fixed. He remarked that Professor Cockerell was the only English architect, he knew, of real power in drawing the human figure. “He is my father,” replied the young man with animation and delight, “and I am trying to follow him.” His pride and trust in the guidance of his father were unbounded, and it is indeed impossible in reviewing his own life not to recognize the inestimable influence which the teaching, example and constant companionship of the Professor exercised in determining the form which the son’s artistic temper finally received. Attendance at architectural lectures, the classes of Townsend at the School of Design, and his dutiful desire to qualify himself for a professional career, contributed probably far less to the moulding of his mind than did the breezy walks over Hampstead, the journeys to great cities and universities where the Professor had works in hand, and the visits to the country seats of eminent persons, in all of which Frederick Cockerell was his father’s chosen companion. He breathed an atmosphere of education in the classical and highest signification of the word. The father’s enthusiasm for art, which was as his very life, diffused itself around him as light from the facets of a brilliant. His bright flow of refined conversation, so courted abroad, never stagnated amid the closer interests of home; and not the less impressive, because neither dully sententious nor cynically dictatorial, were the maxims of æsthetics and the rules of noble life which young Cockerell gathered there. One idea of Professor Cockerell’s, which often formed the subject of conversation, was that, for any approach to perfection, a modern building demands the co-operation of two architects, the one to devote himself to utilitarian arrangement, the other to artistic embellishment. The Professor would even go so far as to argue that no man could give equal and adequate attention to both subjects; and, having himself personal experience of such division of labour in at least one instance,* the suggestion was no bare theory. It may not unnaturally have increased what has been alluded to: the apparent indisposition of a boy to devote to the drier details of the prescribed instruction the same application as accompanied the exercise of his pencil. Withdrawn, however, in his seventeenth year from the generalities of class-rooms to more intimate practical training, he must soon have been disabused of any uncertainty as to the requirements of actual practice. Mr. Goodchild, for many years the valued chief clerk, and through life the faithful friend of Professor Cockerell, who as architect to the Bank of England had offices there, gave him the first lessons in perspective

* The London and Westminster Bank (1837-39) was a joint production, the exterior being especially Mr. Cockerell’s work; the interior was by Mr. (afterwards Sir) William Tite.

drawing; and new offices at the Bank were then in course of construction. Designs had frequently to be furnished for Branches established in provincial towns, so that there was no lack of elementary study. Identifying himself, meanwhile, with every institution connected with the architect's profession, at one time engaged among the working builders upon a scheme for a provident club in their interests, at another assisting in the business of the Artists' General Benevolent Institution, he became every day more heartily pledged, to his father's intense gratification, to share the moral responsibilities as well as the distinction attaching to his name. During the summer of 1850, with an independence then not often confided to boyhood, but forming part of the Professor's educational design, he made a sketching tour in northern France. He returned from the beauties of Abbeville, Avranches and Morlaix to distribute his autumn between the School of Design and some subordinate occupation obtained for him, by the kindness of the late Sir M. Digby Wyatt, in connection with the Exhibition Building in Hyde Park, which, as a novel and an ingenious solution of a difficult question, was attracting great public interest.

The story of the years yet to elapse before Frederick Cockerell launched forth to face on his own account the fortunes and rivalries of the professional world, would be rather a record of his father's work than of anything for which he could be individually responsible. Pleased to be at Professor Cockerell's disposal either for labour or recreation, or for the happy combination of both, he enjoyed enviable opportunities of increasing knowledge and perfecting taste. Interspersed with frequent sojourns at Liverpool, at first as a mere student, but later as superintendent of ornamental details in process of execution at St. George's Hall, to which the Professor gave years of untiring labour, came visits to Apthorpe and the Grange, entertainments by heads of houses at Oxford and Cambridge, and innumerable other introductions which were the more delightful to him that he thus learned how widely shared were his own affection and reverence for his father.

He always had a pleasant recollection of some summer days spent with Mr. Fripp in drawing on the Thames, which only confirmed his love for the colour-box and open-air studies; and hardly a year seems to have passed without his obtaining permission for a trip more or less prolonged on the Continent. Drawings of the *Maison Carrée* at Nîmes, and of the *Pont du Gard*, bear the date of 1851. His constitution was at that time wonderfully robust; and the fair, manly presence and lofty stature of one but a boy in years attracted friendship abroad, which rapidly matured under the influence of his genial manner and loveable nature. The writer of these lines must be pardoned if he yield to the temptation of submitting to friendly eyes a more descriptive picture of noble boyhood than the conventionalities of English biography would permit to be translated by the most loving pen; and which opens a glimpse of a more serious side of the well-known sunny character, unsuspected perhaps by mere casual acquaintance, but none the less of its very essence to the last, and not to be omitted from a retrospect that aims at truth. The extracts are from a letter of tender condolence written by a French gentleman, whom the chances of a crowded inn brought into Cockerell's close companionship that summer:—

“ C'est à Nîmes que je rencontrai, dans l'été de l'année 1851, Frédéric Cockerell et son frère Robert,* tous deux jeunes et charmants, et, de plus, d'une beauté physique remarquable. Frédéric

* Killed in action, September 20th, 1854.

grand et fort, taillé en Spartacus ; Robert, fin et délicat, plein de charmes et de grâces. Cette rencontre m'a laissé une impression si douce si agréable qu'aujourd'hui encore, à vingt-huit ans d'intervalle, ce charmant souvenir est resté dans ma mémoire aussi vif et aussi frais que si cette rencontre avait eu lieu récemment. . . . Frédéric était la bonté même, mais il était si animé, si exuberant, si actif, il avait tant de vie, de force à dépenser qu'il fallait bien que, bon gré malgré, son frère le suivit partout, effrontant toutes les intempéries, les rayons ardents du soleil aussi bien que les pluies diluviennes très fréquentes en ces contrées. Quelle que soit la fatigue éprouvée la veille, et l'heure avancée à laquelle les deux frères s'étaient couchés, ils se levaient de bon matin et la prière était le premier acte qu'ils accomplissaient. Ce jeune Frédéric si fou si insouciant devenait à l'heure de la prière grave et recueilli, ce n'était plus le même homme ; agenouillé au pied de son lit avec son frère, il priait avec ferveur."

There are marked spots in the youthful life of most men who have at any time excelled, to which may not unfrequently be traced some determination of their opinion and taste, or at least their approximation to some more or less model ideal. In the profession of architecture the disposition must sometimes be suppressed, and constantly modified by the exigencies of circumstance and duty, but the impression once clearly made will never be entirely effaced. To some months of severe study at Paris in the spring of 1853, and to the admiration he there conceived as much for the system as for the results of the training in the Parisian school, must be referred a perhaps somewhat exaggerated estimate formed by Frederick Cockerell of the lofty aims and ambition of perfection which he deemed specially characteristic of French architects ; and in his own earlier designs the French idea is profusely blended with the classical.

Caristie, who so far back as the stormy days of 1815 had been a friend and companion of Charles Robert Cockerell at Rome, now readily undertook the direction of his son's studies, lending him drawings, advising him in his copies, and introducing him to men of the highest eminence in his art ; to Viollet-le-Duc among others, and to Visconti then fully engaged on the transformation of the old Place du Carrousel and substitution of the splendours of the new Louvre. To M. Douillard too, the friend from whom Frederick Cockerell had but just parted when he died, then recognized as a most accomplished draughtsman, Caristie commended him for help which was ungrudgingly given. The seed thus abundantly sown fell on no thankless soil ; young Cockerell's diligence was unstinted. "Monsieur est trop matinal," the servant would remark, who found him at work with the sunrise, while his strength and perseverance were a marvel to the friends who noted the earnestness with which he made use of his limited opportunities of out-door work. "Notre Frédéric" (wrote one) "a fait à Chartres des séances de douze heures par un froid assez vif, pour terminer ses dessins." An interesting diary of that to him important time is afforded by a close series of characteristic little letters to his only sister. He tells of the kindness he everywhere received ; how Douillard helped him to master the manipulation of ink ; how Visconti made him free of his *atelier* and works ; how he grudged the evenings which his letters of introduction compelled him sometimes to devote to society, as interfering with his morning's work.

Later in that year he made a fine perspective drawing of St. Paul's Cathedral, which, with some little alterations and introduction of figures suggested by the late Mr. Stanfield, R.A., a constant visitor at the house at Hampstead, was exhibited at the Academy in 1854. Cockerell was early in that year a pupil in the office of Mr. Hardwick, R.A., where there was a great

deal of business ; and, under the immediate guidance of Mr. P. C. Hardwick, who found him, "from his thorough knowledge of his own favourite style of art in many cases of much use," he for the first time assisted in the planning and laying out the site for country houses, in the construction of which he was in later years himself not unsuccessful.

An acquaintance was formed at Mr. Hardwick's with a fellow pupil, now an architect of distinction, who continued ever afterwards one of Cockerell's warmest and most intimate friends. He has kindly contributed some reminiscences of their student days together, which cannot be better given than in his own language :—

"Many must remember him still as he then was, a bright handsome young fellow, full of spirits and enjoyment of life, and imbued with an enthusiastic love of art, which lasted in full vigour till the day of his death. Added to these attractive qualities he had inherited an indescribable charm of manner, which crowned his popularity and placed him in the first rank of any society into which he might be thrown. Although he was several years my junior I have always felt that, having had no previous special training, I owed to Fred Cockerell's influence and example a great proportion of what little knowledge and appreciation of art I may have been able to acquire in the years 1854 and '55. He had always lived in an atmosphere of art, and at that time was in this respect far in advance of his professional contemporaries. In the late summer of 1854 we made a sketching tour together through Cambridge, Lincolnshire, Northamptonshire and part of Yorkshire, spending our time in the study of the more important buildings. At Ely, the Dean (Dr. Peacock) gave us keys which enabled us to explore every part of the then unrestored Cathedral at our will, a privilege of which we availed ourselves without stint. I look back to this tour with the greatest pleasure. It was the first time I had been thrown into such close companionship with my friend, and the first occasion on which, with his help, I began to realize the true practical use of the intelligent sketching and measurement of old buildings. The only drawback to our experiences which I recollect was the kindly-meant but inconvenient hospitality of which we were the victims. Our fathers were then living, both equally well known to all cathedral authorities ; we thus found ourselves overwhelmed by cordial invitations wherever our names became known. As we wished to devote our evenings to the revision of the day's work and laying down measured plans, this did not suit our views, and we were driven to adopt various amusing shifts to escape detection. With anyone less energetic than Fred, or less amply endowed with those genial qualities which make travelling companionship delightful, a tour comprising so much seen and done would have been impossible. But having become thus intimately acquainted, we started together without any misgiving in the early days of 1855 for Rome. In Paris, on our way, he received an enthusiastic welcome from the young French architects and painters, whose friendship he had secured during previous visits.

"The first impressions produced on arriving at Rome are usually, I believe, in the case of anyone who has looked forward to it as an epoch in his life, to some extent disappointing. They were certainly so to both of us, and it was not till we had time to become familiar with its principal features that we began to experience those feelings towards Rome which make everyone leave it with regret and draw one back at the first possible opportunity. Our artistic tastes and proclivities, partly from training, but as much I think from natural disposition, were in many respects opposed ; and although the cordiality of our mutual relations was never for a moment in danger, we had many a warm discussion resulting sometimes in a practical divergence in the matter of subjects for study. Thus, while my own tastes led me often to prefer earlier remains to the works of the Renaissance, he (much to my advantage) used to point out beauties and refinements in the later buildings which I might otherwise have passed unnoticed ; at the same time he showed a knowledge of sculpture and painting, and of the great masters in both those branches of art which left me far behind.

"The allusion to painting leads me here to mention a phase of feeling through which Fred passed during this visit to Rome, which was quite painful in its intensity while it lasted. This was an eager longing to become a painter instead of an architect. At that time the present gifted President of the Royal Academy was painting in Rome, and sending home (if I mistake not the year) his celebrated 'Triumph of Cimabue.' Whether the intimate companionship of such a man and the daily inspection of his work, with that of other artists then in Rome, first fired a latent ambition, or whether the conscious desire was of earlier origin, I am not sure; but the longing, as I have said, became so intense as to interfere seriously with his health and spirits while the period of incertitude lasted. This, however, was not of long duration; a letter of appeal to the decision of his father brought a long reply unfavourable to his views, but containing advice so sound and arguments so convincing that whatever Fred's feeling may have been he never afterwards suffered it to interfere with his architectural studies and training. After a stay of some three months in Rome we visited successively Rieti, Spoleto, Assisi, Perugia, Arezzo, Florence (where we stayed a month), Siena, Pisa, Lucca, Genoa, Milan, Como, and other cities. After crossing the St. Gothard our paths diverged.

"I have nothing to say of my old friend as an architect beyond what all the world knows—that he was a highly accomplished and thoroughly conscientious artist; but I had peculiar opportunities of forming a perfect estimate of his character as a man, and I cannot conclude without trying to give some idea of the place he filled in my affection and regard (as he must have done with all who knew him intimately) and the reasons for it. The first thing which made his character so fine a one was its absolute truth and simplicity. In what he said either in public or in private there was never any *arrière pensée*, never anything kept back: he would tell you his real views, his whole mind; and yet in such a manner as not to wound your feelings if it were simply a matter of opinion. His strong language—for he could use strong language on proper occasions—was reserved for shams, cant, humbug, and meanness or littleness of every description, for all which, being utterly incapable of anything of the kind himself, he had the most uncompromising contempt and horror. When to this great quality is added a most affectionate and sympathizing disposition, an unwavering steadfastness in friendship, and a singular generosity of mind in all things small and great, we have a character as noble and loveable as one could wish to meet with. His untimely death has left a void which cannot be filled again."

One would wish that the letter, from Mr. Cockerell to his son, which so emphatically determined the rivalry between painting and architecture as the aim and object of a mind delicately sensitive to the beauties and attractions of both, had been preserved. It could only have been on the most earnest conviction that the indulgent and loving father disappointed a desire so keen, and dealt a wound at the time so mortifying. For he was himself as appreciative of the glories of success as he was critical of mediocrity in painting; and his nervous pen, well skilled through years of laborious composition to analyze artistic feeling and to interpret every modulation of its faintest utterance, must have treated the subject with the most cogent argument and exhaustive judgment. Doubtless he rested his decision upon an estimate of his son's best powers, of which none could have so tenderly watched the development or so rejoiced in the promise. Yet it is more than probable that young Cockerell's ready acquiescence in the decree, which closed one bright avenue to his ambition, was dictated rather by dutiful obedience than by whole-hearted concurrence in the answer to his appeal. However that be, it often occurred to his friends to reflect whether the satisfaction of undoubted claims to distinction would not have been completer in the field of the more imaginative than in that of the more constructive art. One of his colleagues, previously mentioned, who was executing important

work when young Cockerell was in his pupilage, thought his talent eminently that of a painter, as lacking some of the more prosaic elements which are essential to an architect's full success. An opposite opinion is that of a man of great accomplishment who was much with him in Italy, and who does full justice to his drawings. Writing recently of his own delight in an intimacy which only death dissolved, he endorses the elder Mr. Cockerell's view. "Fred's exquisite sense of beauty in form," he says, "marked him out for an architect or a sculptor. I always thought him somewhat deficient in the perfect sense of colour, without which no one can become a really great painter."

The question is only of interest to those whose admiration of Frederick Cockerell's abilities may beget the wish that his too short life had been crowned with more publicity of renown. He never himself openly alluded to that critical determination of all his energies; never repined at the authority which called him back from following a light that had seemed to invite him into the more flowery path. The die was cast, and loyalty set its seal upon any expression of lingering regrets. But that he was not without skill in colouring is sufficiently attested by his Italian and Sicilian sketches; and his Arch of Titus (1855), exhibited at the Academy, is a highly finished work. Although his knowledge of the technicalities of oil was necessarily limited, few excelled him as a judge of painting; few, even among professors, could better estimate the merits or guess the authorship of a picture. To spend hours on his knees endeavouring to revive the faded colours of any old Italian canvas was to him a delight. He would be wrapt in admiration of any beautiful work of the old masters; it seemed at times to monopolize his thought. Often, when conversation wandered, he would lead it back to the subject which possessed him. Was the old spring really dry at his heart, or did it still keep green some vision of the untried land of which he felt perhaps that he had sacrificed to duty some share in the conquest and the spoil?

When on entering Switzerland he parted with his friend, it was to join his family in Paris, where the first Paris Exhibition was gathering its crowds, and where his father was engaged among the English Commissioners; and more than twenty years afterwards, when visiting Chambord, Frederick Cockerell recalled an excursion thither with some of the most distinguished men of the two countries during that exhibition summer, and of the impression made on him by the lucid criticism of Sir Charles Barry. There was indeed no lack of amusement in the French capital at that time; but the full love of Italy was upon him, and within a very few weeks he was writing home from Venice the most enthusiastic descriptions of its inexhaustible interest and beauty. For two months he could not tear himself away; then it was that he did some of his most careful work. As autumn waned, letters from Padua and Vicenza, from Mantua and Florence, from Siena and other charming resting places on the road to the Eternal City, formed a journal which delighted its recipients at home by picturesqueness of illustration and evidence of appreciative study.

Those Roman winters of young student life—what a light flashes from them to gladden the afterdays! What vivid memories of friendships formed, of lessons learned, of all the varying gleams that played upon the joyous current of the time! During that winter of 1855-56 a colony of nine young Englishmen had its abode in the Via Felice. Most were hard workers, but the dilettante element was not wholly unrepresented there, and the bonds of union in the brotherhood were so close that, while the studios were recreated, the veriest

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L'Ariceia. April 27th 1855



Vigonza

*Pal. Vicentini Risti
May. 1st 1855*

Photo Lithographed & Printed by Isaac Aikman, 6 Queen Square W.C.

SKETCHES BY FRED. P. COCKERELL.



amateur could not fail to gather something of the realities of art from an association which to its survivors is a lasting delight to recall. In the English society of that season, which chanced to be peculiarly agreeable and well assorted, its members of both sexes often related how the "Felice men" made their mark.

The day spent by the painters of the party with their models, it may be, or other work at home, would be from its earliest hours devoted by Cockerell to careful studies and reproductions of the most noteworthy features of Rome's palatial and monumental glories. It closed with a merry dinner gathering of all at the Caffé Grecco. No sumptuous feast was spread, no affectation of the power of expenditure permitted itself; the joke was who could dine most cheaply, and the seasoning of the repast was the good fellowship and humour of the guests. Entertainments followed at the hospitable houses to which the colony would be invited *en masse*. Tableaux arranged by their artistic skill became a favourite amusement. "Where we all did our best," says one of the party, "to enliven the society, Fred was the most successful. Besides his charm of manner and the knack he had of always looking smarter and at the same time less self-conscious than anybody else, he had a great advantage over the rest of us in his complete mastery of French and Italian. His superior knowledge of the languages and their literature, and his consequent appreciation of the best elements in foreign society, enabled him to derive more benefit probably from the stay in Rome than any of us."

If prosaic be a term not inapplicable to much of the labour incident to an architect's profession, prosaic indeed must the subsiding into the routine of office life appear to every young English student who returns to it from Italian sunshine and the ἀνήριθμον γέλασμα of the Southern Seas. Especially must this be felt when no public individuality has as yet been attained, when reward is by no means the immediate follower of toil, and the first pride of relations with an admiring client is a sentiment of, at best, an uncertain future. Cockerell went however at once always cheerily to harness on these occasions, his reward being the conscious ability to render real service to his father. For the Liverpool and London Insurance Office and other buildings about to be commenced at Liverpool he did much of the design. The Professor had resigned his chair at the Academy, and was gradually giving up all his appointments and retiring from his active share in professional life, except where a few private friends still claimed the assistance of his taste. On matters of decoration Frederick Cockerell's experience and judgment were now of value, and he is found through this year, as his father's colleague and *alter ego*, directing the progress of such work for Lord Ashburton, and at other important country seats; so that on drifting from home residence into chambers of his own he had already some repute as a young man of culture and capacity. At his father's desire he threw himself with great energy into the competition for the Government Offices, designs for which in every conceivable style and from every variety of hand may be remembered as attracting crowds of critics to Westminster Hall, where they were exhibited in the spring of 1857. But by that date, little remaining to claim close attention at home, he was away again to the inexhaustible treasuries of artistic aspirations and achievement, where nothing pleased him more than to find himself once more in the company of his Parisian friends. "Si par hazard il y avait des dates" (writes M. Pellechet) "sur ses beaux et nombreux dessins, on pourrait facilement reconstituer ses voyages." His portfolios are his itinerary: Palermo, Girgenti, Taormina are laid under liberal contribution, with MM. Vaudremer and Hardy, associates of

the long delightful days. With the latter he passed a month at Pompeii, and revelled in the beauties of the coast scenery at Castellamare, Salerno and Amalfi. In the intervals between these repeated foreign expeditions (for in 1858 his dated work records that he was engaged on the architecture of the chief cities of Germany) his father's professional career being closed, and but little business finding its way into his own office, young Cockerell availed himself freely and with thorough enjoyment of his *entrée* into the fashionable world.

Cockerell's first independent professional work was done in 1858-59, consisting of a cemetery chapel and other buildings at the picturesque little town of Ledbury, which, giving satisfaction to the townspeople, led to his building one or two small houses in the neighbourhood. His speciality came to be the design of country houses and the alteration and improvement of existing ones; and one of his earliest successes was achieved in raising the elevation and making additions to Coleorton Hall, the beautiful seat of his cousin Sir George Beaumont, which materially improved the proportion and dignity of that somewhat bizarre work of Dance. Among the more important of the many houses, which, throughout the English counties bear silent testimony to his skill in plan and grace of execution, are Down Hall, Essex (Sir H. Selwin-Ibbetson, Bart., M.P.) in the Italian style, where an excellent effect is produced by the use of concrete with decorative panels in sgraffito; Lythe Hill, Haslemere (J. Stewart Hodgson); and one of the most recent, Crawley Court, near Winchester. This is a large and imposing work, its idea a modified Elizabethan, its material brick and the grey flint of the country, with terra cotta introduced into the window mullions, the whole effect being very light and soft. There were difficulties here connected with the site: some exceptionally fine tall trees stood in close proximity, and it was feared that any building short of being colossal would be dwarfed by them; but Cockerell managed his elevation with such judgment that the house, without being immoderately large, seems to reign duly supreme and asserts itself a successful rival to its lofty surroundings. One undeniable merit attaches to his residential buildings, the more remarkable as it indicates a feeling apart from his delight in the beauties of proportion and decorative work. If Mr. Kennard's mansion of Crawley be specially instanced, it is because it was Cockerell's largest and (with the exception of Woodcote, the seat of C. C. Cotes, M.P.) his latest completed work, and because its owner's comparatively recent acquaintance with his architect led to a strong personal friendship from his admiration of the conscientiousness and skill by which the fulfilment of his own wishes and requirements were combined with unyielding assertion of artistic principles and effect. Cockerell was always especially studious of the *genius loci* where he was called upon to build. Whether a modest rectory or a stately manorial residence were in contemplation, Nature was always duly courted in council over the projected site, its facilities and beauties harmonized with the invasion of its domain, and every less attractive feature softened by careful study and subdued. The Carlisle Memorial Column, at Castle Howard, testifies to his capacity for taking advantage of a fine position to atone for a limited expenditure by the exercise of appropriate taste; and a column in the beautiful park of Sir R. Bateson Harvey at Langley has been admired for its correctness of dimension and beauty of design.

He had little opportunity in the Metropolis of displaying his powers: a slight but pleasing memento exists in the front and entrance to the gallery of the Society of Painters in Water-colours in Pall-mall, and he executed a few private houses; but his only work of importance

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THE FREEMASONS HALL, LONDON.

Back of
Foldout
Not Imaged

in London is Freemasons' Hall, for which his designs were selected in competition, (1864). It is marked by his distinguishing characteristics, originality and beauty of detail; the façade is rich in emblematic carving and sculpture. The highest recognition of the success within the power of the craft to bestow was shown by their architect's immediate appointment to the high office of Grand Superintendent of Works, which, although one subject to annual change, he continued to hold to his death, when, in his own Lodge where he had been greatly esteemed, the unusual tribute of three months Masonic mourning was paid to his memory.

A reflection will occur to all who criticized in his company or conversed with him upon the works of bygone days or of those of contemporary architects: he was unusually liberal of appreciation in Art. It was, for instance, impossible for anyone to be more free from bigotry in favour of the classical or the mediæval school or any special development of either. With the former naturally enough his name was in early days hereditarily linked, but his sense of the beauties of the latter, in their proper association, was manifest in the reverent care with which he always approached the restoration or enlargement of old buildings; and his School Library and Chapel at Highgate have been approved by men whose own successes in that style give value to their opinion. But Frederick Cockerell regarded style as altogether second in importance to the great principles which underlie all beauty, and which his power of analysis enabled him in every work of merit to distinguish and to prize. Eminently catholic in æsthetics, from a naturally acute perception of beautiful things and the effect of early education, his sweetness of disposition and utter freedom from any spirit of captious detraction robbed even the most condign disapproval of offence, so that those of his younger associates who sought his judgment found in the critic the friendly teacher too.

It is no aim of this brief notice of a lost friend to argue or insist upon the merits of his executed work; his own modest sense and distrust of sentimental appraisalment would most earnestly have deprecated such a venture. Let the votive tablet be rather dedicated to those graces of mind and capacities of heart which distinguished him living and endear him dead. M. Douillard relates the following instance of his generosity:—He had commended to Cockerell's care, some fifteen years ago, one of his pupils whom poverty compelled to join his widowed mother, then settled on very slender means in this country. The young man was consumptive, and his frail tenure of existence was imperilled by the severities of the English winter. This circumstance made it difficult, to many it would have seemed hopeless, to assist him. But Cockerell's was not the spirit that could dishonour such a draft upon his benevolence; he sent his protégé to Pompeii for the winter, undertaking the disposal of his drawings. That he was himself the purchaser may be imagined by any whose charity has experience of such self-imposed commissions; but the plan so far succeeded that the young Frenchman was enabled by it to earn a maintenance for the remainder of his fragile life. Some of his drawings were dispersed at the recent sale of his kind friend's library—they bore the name of Clairvaux.

The story of Cockerell's youth has chiefly occupied the pen in accounting for the affectionate esteem which enshrines his memory. For in fact the colouring of youth pervades the retrospect of all his days; the outline many will fill in with pleasant thoughts. The simplicity, the playfulness, the energy of his early life were the adornment of its maturity. On the very morning of his death, deploring in conversation with a friend the prevalent depression as fettering the advancement of many young and able colleagues, "I have no right

to complain," he said, "for I have perfect health and never know fatigue;" but in half an hour he was no more. To be so suddenly cut off in the plenitude of strength, and ignorant of the sufferings of decay and of the thwarted aims and secret regrets that burden many deathbeds—such an end is not of those which are the most tragic in the world's experiences. It is the close that poets have called blessed to a life of intellect and action—if death could but in mercy touch only the one brave heart whose pulse it stills! Indeed, Frederick Cockerell's home life had been supremely bright; he married in 1867 a daughter of Thomas Homan Mulock, of Bellair, King's County, and the oneness of her every feeling and interest with his own combined with the tender graces of fair children to form for him a crown of happiness. His eldest boy was destined to his father's profession; and, should the tryst be kept when so much example and guardianship are gone, his father's friends will welcome him and show that there is such a thing as keeping a remembrance in the heart.



. The Secretaries have been requested to add the following note from Charles F. Hayward, F.S.A., *Fellow* (sometime Honorary Secretary):—

"I would call attention to the direction in style taken by the genius of Mr. F. P. Cockerell under the influences of in the first place his father, and in the second place the office of Mr. P. C. Hardwick,—resulting in those designs for country houses: Lythe Hill for example, which I venture to think is not only a distinct mark in artistic design but which gave promise of a further development,—by steady, earnest and thoughtful work devoid of any straining after effect or haphazard picturesqueness. I attribute this to the careful study which was the habit of the elder Cockerell, and which I personally noticed in helping with young Frederick more than twenty years ago to work out the last building executed by the Professor—The Insurance Office at Liverpool. It was often that the work of days or even weeks was abandoned to make way for some improved idea, the result of Mr. Cockerell's study at home in communication with his son Frederick. No trouble or expense to himself was ever spared to have the work worthily designed. I possess a sketch (given to me by him at the time) of one of Fred Cockerell's first designs for the Government offices, which shows much more than his finished drawings the extreme care with which he thought out his design, as well his great skill with the brush whereby he was able to touch in upon the slightest pencil lines the complete effect intended, with figures, statuary and ornament complete. To the careful study of classical work under his father's eye there was superadded the Gothic influence of the time then quite as predominant at Mr. Hardwick's as elsewhere. Even the Academy had begun—so it was whispered among intending students—to admit the idea of a Gothic design for probationers. But Fred Cockerell, who never felt the full force of Gothic fire, and being still bound by the steady influence of high classical culture, was saved from many of the extravagances the pure Gothicists often fell into, and so produced works which may possibly be of more lasting value, as art work, than many more picturesque or piquant designs. At any rate it is worth while pausing to think over the short career of such an artist, and, with the remembrance of the shifting tastes and influences of the period in which he lived, endeavour to judge our own work by that of one who has finished his course—kept the faith and attained the crown."

DISCUSSION.

CHARLES BARRY, F.S.A., *Ex-President*.—I have been called upon by the Chairman to tender the thanks of this Meeting to the writer of the eloquent Paper we have heard, which must have touched other hearts as it has mine. The writer desires that his name shall be unannounced, and there appears to me a strange propriety in this because he has, in the Paper, spoken the sentiments not of his individual self alone, but of us all; and we can sympathize entirely with every sentiment and every word that we have heard as though we ourselves had been speaking from our own knowledge of him who is gone. Lament for him I think we cannot. Lament for ourselves of course we must, but just as a mother treasures up bright ideas from her unconscious infant of the future man of intellect and talent, so, from the comparative child's career of our lost friend, we might have augured, and I think we do all believe, that, had it been according to the providence of God to have spared him to a green old age, every promise, every hope, every aspiration which affection could desire and which wisdom could promote, would have been fully and entirely satisfied. He is to be almost congratulated, if such a word can be used under such circumstances, in leaving amongst us a memory unmixed with envy. His career was not sufficiently developed in the strife of professional life to excite unkindly criticism or jealousy; only a memory of the kindest sort can ever surround the name of Fred Cockerell. But one short year has passed since we saw him here amongst us, rejoicing in the advance making, as he believed, in the public esteem of our profession, in which this Institute has had no mean share, and in which he willingly took a labouring oar with his colleagues. It is given to us all I think to take a certain amount of pride in the work, though individually it is of course very little, that each is able to do for the advancement of the society in which we live, and in advancing the profession to which we are all devoted. That gratification our lost friend had. He knew the esteem in which he was held; he could not but know the good work that he had done. He had reason to believe that it would leave an excellent impression behind him, as indeed it has done; and in all these considerations his memory is a happy one. Some allusion, and a very touching allusion, was made in the Paper to his, at one time, idea and desire to become a painter rather than an architect. Many of us, I am sure, have in our younger days shared that feeling. Many of us, too, have felt delight and extreme gratification in the fields of imagination to which our studies lead us, and have experienced a feeling of shrinking from the prosaic paths of business and dry science with which the art of architecture must of course be inseparably connected; but it is just that feeling of appreciation of art, and indulgence in the imagination, which is one of the true characteristics of a real architect, affording a recompense for the toil and the routine of the business part of our lives. I think the profession of an architect would have little or no attraction for many of the men I see around me if with the strict exactitude of science and the requirements of daily life, and the necessity of strict exactitude in business and attending to pecuniary exigencies, were not mixed the opportunity occasionally of indulging in the imagination with which each may individually be gifted. I should be very

sorry indeed to think that in our professional work one faculty was divorced from the other. Another fact, mentioned by the writer of the Paper, refers to a feeling which I think we can share with our lost friend, and that is the disappointment he felt when he first entered Rome. I can remember that that was my feeling, and I can quite remember the involuntary exclamation—Is this Rome?—the Rome of my dreams, my admiration, my desire to see—this dirty, miserable, wet, squalid-looking street—Is this the Corso? But like Cockerell, three, four, six months residence in the Eternal City dispelled all that disappointment, and the desire to return, nay the determination to return, dated from the day of my departure. In my case very many years elapsed before that desire happened to be gratified. The intense pleasure of revisiting Rome, when an architect can go back to it with matured taste and greater knowledge of what he really wants to know, and greater power of learning than he had in his student days, is really beyond description. I hope I have not trespassed too long upon your time in making these remarks, prompted as they are by personal feelings, and, I am sure, entirely coincided in by many of those around me.

CHARLES L. EASTLAKE, *Fellow* (late Secretary).—The brief but faithful memoir which has been read this evening is one of deep interest to me, for many reasons which may easily be guessed. I enjoyed our late colleague's friendship for more than twenty years. Indeed it was while I was a pupil in Mr. Hardwick's office, which he entered for a year or so to complete his studies, that I first made his acquaintance. We attended Professor Donaldson's lectures together, and I think became students of the Royal Academy about the same time. There are no doubt some members of this Institute present who remember him in those early days, and I am sure they will agree with me when I say that in the youthful coterie, to which we then belonged, there was not a brighter spirit, a kindlier heart or a more accomplished hand, than that of Fred Cockerell. The accident of Mr. Cockerell's family connections gave him, while still a young man, an *entrée* into the world of fashion, where his brilliant social qualities and his engaging manners, no less than his artistic ability and highly cultivated taste, soon made him a general favourite. But although in such society he was the gayest of the gay, the popularity which he then enjoyed, and which might have turned the heads of weaker men, did not make him vain or indolent. He possessed that happy faculty which distinguishes some professional men, of being able to work and play by turns, and he did both with equal zest. Behind that easy nonchalant air which he sometimes assumed, there was in reality a deep and earnest devotion to his art and a capacity for taking pains which was very remarkable. He was rarely satisfied with his own designs, and his artistic aim was, probably, often beyond what he succeeded in realizing. One of his early characteristics made a great impression on me when a boy. I mean the intense filial respect and devotion which he felt for his father, who in his turn was equally proud of his son. Indeed it was delightful to see the two men together and to note the love and confidence which existed between them. Manly and straightforward in the expression of his opinions—upright and honourable in his professional career—with a supreme contempt for all that savours of bigotry and affection in the practice of his art, Cockerell was, to my mind, and I am sure in the opinion of most who hear me, admirably qualified for his position as Honorary Secretary to this Institute; and I can truly say that during the seven or eight years in which we held office together—a period of uninterrupted cordiality between us—I never sought his advice in vain, and that advice

always seemed to be dictated by a sound and an accurate judgment. Of his professional works, I, who am now altogether outside the profession, will leave others to speak, contenting myself with this brief but sincere tribute of respect to the memory of a dear friend and former colleague.

GEORGE AITCHISON, B.A., *Fellow*.—"Those whom the gods love die young:" can we therefore regret for Cockerell, that he was cut off in the plenitude of health, of youth, of happiness and success? But for ourselves as architects, as Londoners, as Englishmen, I think it is a great misfortune. Fred Cockerell was to the architects what the present President of the Royal Academy is to the painters: he was the most accomplished and polished gentleman amongst us. No man ever passed an hour in his company without feeling that he was in the best society; and his look always reminded me of one of the great kings of France. As far as architects go, Fred Cockerell was the representative of the great men of the Renaissance; he was young with a child-like simplicity, with vigour of mind and power of enjoyment. He was many-sided like a cut crystal, from each facet of which as it swings the sun flashes. There was no side on which you could attack him that he was not fully equipped, and from which there was not a sort of lightning flash of genius. He could criticize the works of novelists and poets, the works of art of the ancients, or of our own distinguished painters and sculptors. In the journeys many of us have made in his company, no one ever delighted us more than he, when he descanted on the charms of the landscape or the particular qualities of some of the buildings, the paintings, or the sculpture we had before us. I cannot help thinking that, for an architect, this appreciation of everything beautiful, combined with his power of figure drawing and figure composition, was almost unique. No man, however brilliant his intellect, without Fred's trained eye and hand, could do the things he has done, and I most deeply regret that he was cut off in his prime, before he had the chance of adorning London and his country with some fine public buildings.

HORACE JONES, *Vice-President*.—"As the oldest member of a small coterie of architects who for twenty years have been in the habit of friendly and brotherly intercourse, I feel it difficult not to attempt to add on behalf of those who are left with myself one word in tribute of our respect, esteem and love for our lost friend. Another one went before him, Digby Wyatt, well loved, well revered, well respected—and to our deep regret, though we know that they must go. Poor Fred has now gone too; he was one whose high intellectual qualities we must all look back to, and whose cheery, honest English character we must all remember with affectionate regard.

The CHAIRMAN (T. HAYTER LEWIS, F.S.A., *Vice-President*).—"I think that few can feel much more than I do the very touching way in which this memoir of poor Cockerell has been written. Like most of you I knew Cockerell well. I have worked with him for many years and can bear cordial witness to his artistic, elevated and enthusiastic feeling in conversing upon all points connected with art. The sketches which adorn these walls may give you some notion of what his talents as a painter might have been, and in thinking of that passage in his life in which his inclination towards the study of painting instead of architecture is described, I cannot help being reminded of a somewhat kindred feeling in that famous architect, Inigo Jones. The actual change, the well-known words are recorded by Horace Walpole when he says, relative to Inigo's journey to Italy: "He threw down the pencil and conceived Whitehall;"

he changed from his first vocation of a painter to become the world-renowned architect whom we know. I can perfectly understand the feeling with which one calls to mind the associations of early life in such a place as Rome, and of one's early companions there. The writer of the Memoir speaks of the Via Felice. I call to mind another street not far off in which a number of our friends, many of whom are now passed away, formed a coterie certainly to our own pleasure, and by rubbing together kindred minds, no doubt, also to all our edification. One can quite understand also the feeling of coming back from such an association, where everything is *couleur de rose*, and then settling down to a profession which requires much hard study and hard work, and in which there is a great deal that is not always quite *couleur de rose*. Cockerell's example points out well that one ought not to be disheartened by a feeling of that kind. It is the same with other professions. A young man comes from the university and settles down in a barrister's or solicitor's office, and he has just the same hard commonplace work as we have, so utterly different from the imaginative work to which he has been used. There is a sort of humiliating difference between the two; but it is our duty, and we must do it. Cockerell did it, and not only did his duty towards his clients, as he was bound to do it, but towards us outside the strict work of his profession, for he devoted to this Institute a large amount of his time. One may perhaps often feel acutely enough the old saying which Mr. Aitchison quotes: "Those whom the gods love die young." But the happiness thus hinted at is for the lost, not for those whom they leave behind; to them is left a deep vacancy, keenly felt at first and ever difficult to fill up.

The Vote of Thanks, seconded by Mr. Eastlake, to the author of the Paper, having been put from the Chair, was passed by acclamation.



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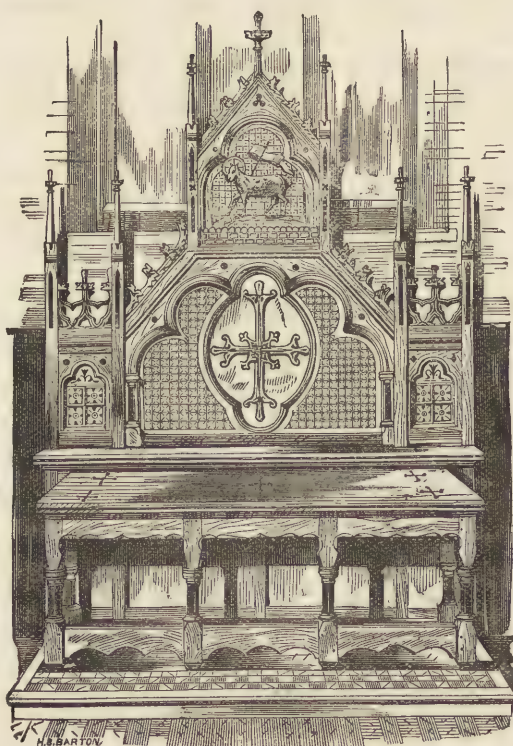
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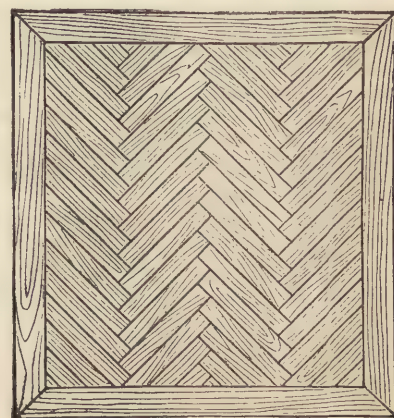
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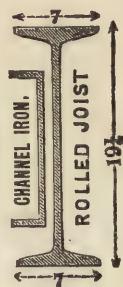


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5 x 3½	2 x 2	4 x 3 = 12 "	6 x 3 = 16 "	8 x 5 = 29 "	10 x 5 = 36 "	16 x 6 = 62 "	3 x 3	8 x 3½	
4 x 3	1½ x 1½	5 x 2 = 8 "	6 x 5 = 29 "	8 x 6 = 34 "	10 x 6 = 54 "	18 x 6½ = 82 "	2½ x 2½	6 x 2½	
4 x 4	1 x 1					19½ x 7 = 100 "	2 x 2	4½ x 2½	
		JOISTS—Lengths, from 6 to 36 ft. PLATES—Width, 6" to 18"; Length, 12 to 30 ft.; Thickness, ½" to 1".						1½ x 1½	2½ x 1
							1 x 1	2 x 1	

JOISTS—Lengths, from 6 to 30 ft. PLATES—Width, 6" to 18"; Length, 12 to 30 ft.; Thickness, 1/2" to 3/4".



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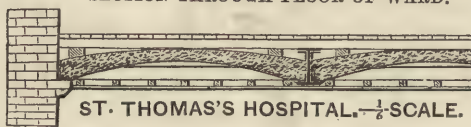
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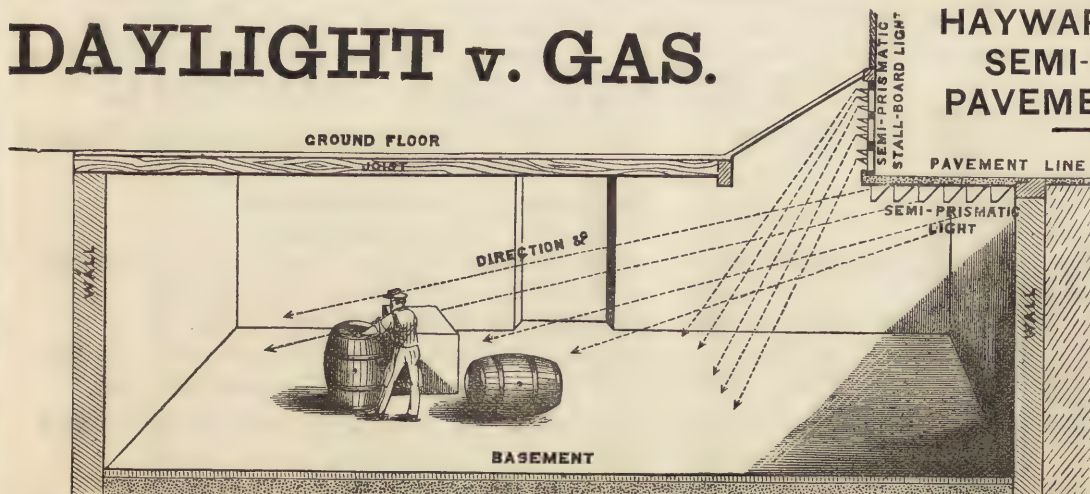
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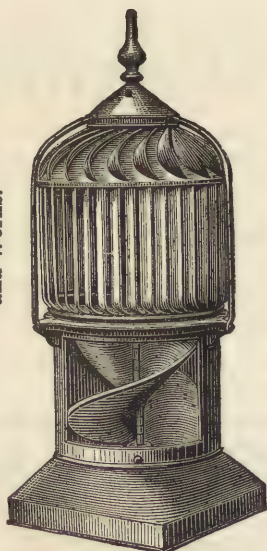
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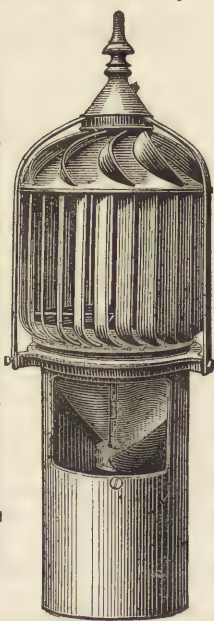
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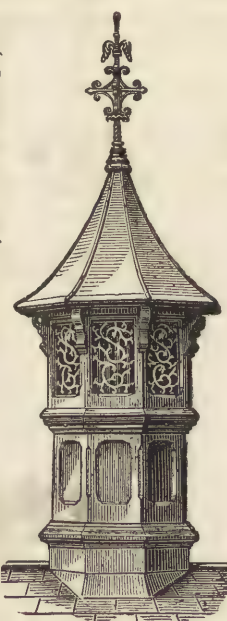
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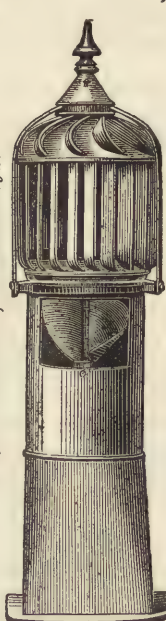
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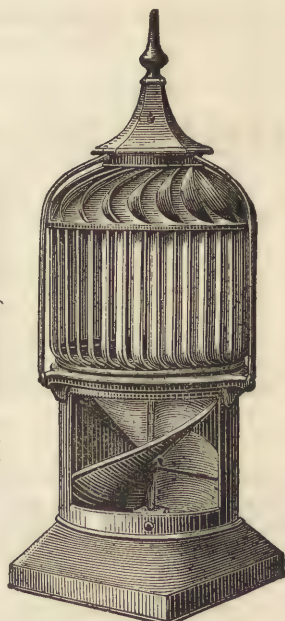
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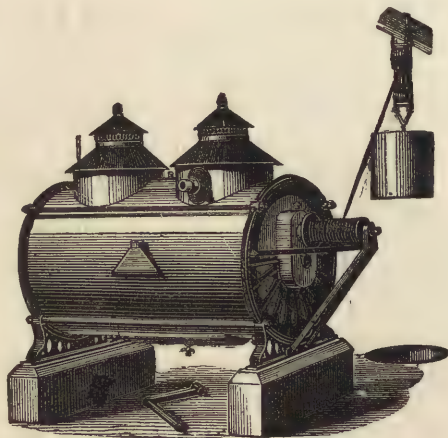
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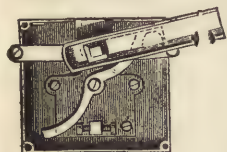


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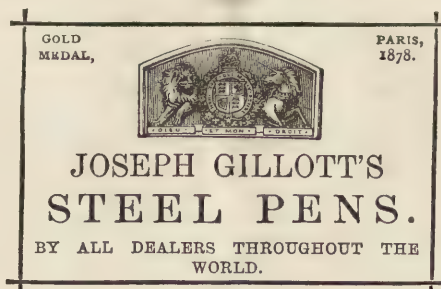
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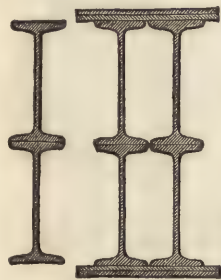
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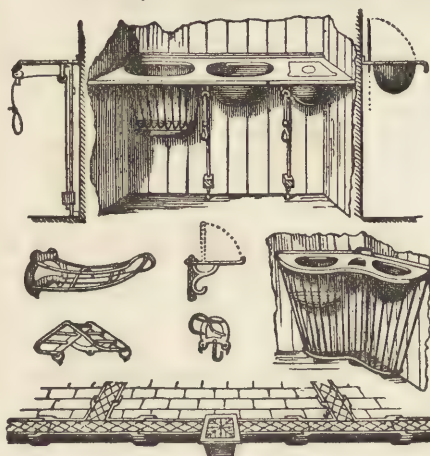
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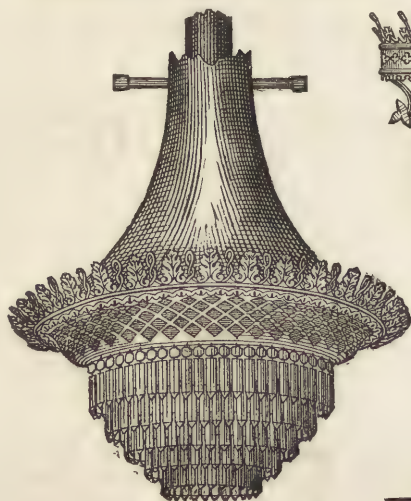
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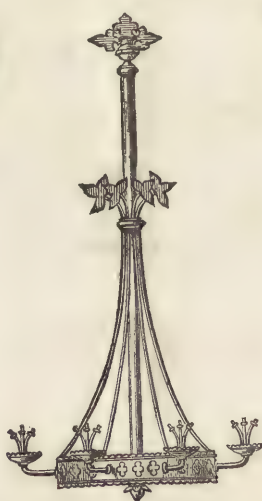
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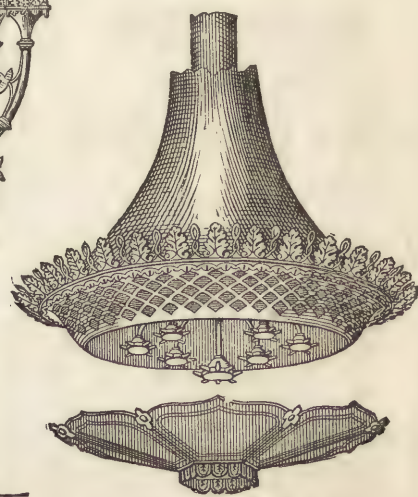
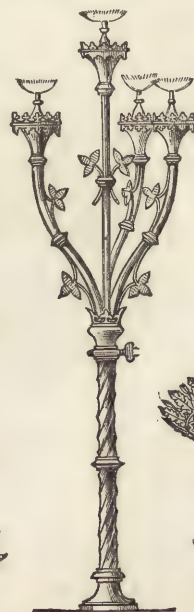
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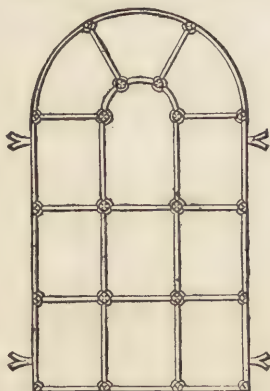
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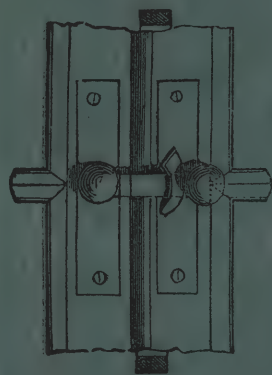
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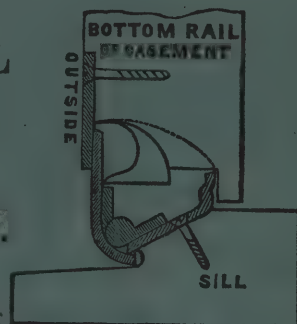
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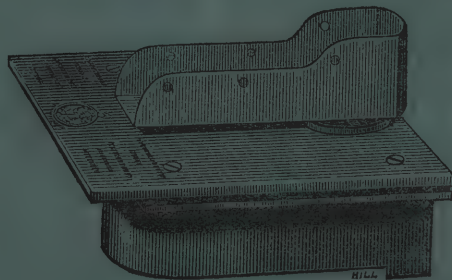
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2.	Frederick Pepys Cockerell: a Memorial Sketch	Dec. 15th.
3.	Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S.	Jan. 12th, 1880

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1880 JANUARY	12 — 26	1880 APRIL	5 — 19
FEBRUARY	9 — 23	MAY	3† — 24
MARCH	8†	JUNE	7§

† Special Meeting. ‡ Annual Meeting.

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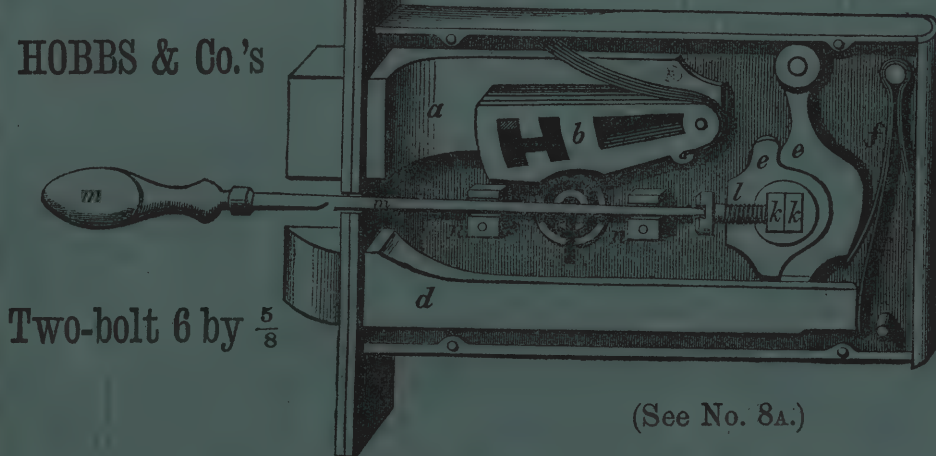
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III. BUDDHIST ARCHITECTURE IN THE JELLALABAD VALLEY.

By WILLIAM SIMPSON, F.R.G.S.

THE extension of our knowledge of Indian Architecture to the region of the Indus has been productive of important results. The space of time is but short since we were in all but complete ignorance of the ancient remains of this part of the world. Twenty years ago scarcely any materials existed from which an idea could be formed of the styles of architecture that had been practised there in the past. Now we have considerable data upon which to work, and already some valuable deductions have been made. Standing out prominently among the points arrived at is the fact of a Greek influence having filtered through the Bactrian provinces to the Indus, which it crossed and penetrated as far as the Punjab and Cashmere—how much further is a point not yet reached. This fact is of very great importance as bearing on Indian architecture, but it is at the same time of equal importance to the history of Greek art. We already knew the vitality which the architecture of Greece possessed, and which carried it to distant regions at an early date; still we have a further proof, in this now accepted theory, of its remarkable power, and that like the Macedonian hero, it carried its conquests beyond the Indus. Along with this we have another point now equally well established, and of high value to the art historian, which is, that previous to the Greek there was an influence brought from the Euphrates valley, most probably from ancient Persia; this not only crossed the Indus, but penetrated at least as far south into India as Karli on the west, and Buddha Gaya on the east. The bell-shaped capitals in the Karli Cave, and on the Buddhist lats, as well as in the sculptures at Bhilsa, and other places, had often been identified with the well-known Persepolitan examples, but all doubt now ceases regarding their source; that point having been made clear from the details found in connection with them on the western bank of the Indus and in Afghanistan.

It has been very common for writers to affirm that all remarkable things in the past had their origin in India. This is now exploded. All inquiries seem to tend to the conclusion that religions, conquerors, ideas, art and architecture all crossed the Indus into India; with the exception of the Buddhist propaganda nothing ever went in the other direction. Perhaps no better illustration of this can be given than the invasion of India by the two styles of art just mentioned. Here we have reflected light on the history of the region, and we find light which is valuable as historical data, as well as being an addition to our knowledge of art.

The first suggestion of the existence of Greek art in the region of the Indus is in the account of Elphinstone's mission to Kabul. In 1808, while returning through the Punjab, the members of the mission visited the Manikyala Tope, and remarked the Greek character of some of its parts. Professor Wilson, who refers to this,* seems to discard the opinion, because, as he says, "it has been since fully proved the work of Indian artists."† In 1860 I visited this well-known monument and made sketches of it, and the result of doing so was to leave no doubt in my own mind as to the Greek origin of its details. On my return to

* *Ariana Antiqua*, p. 31.

† General Cunningham published, in 1848, a small work called "An Essay on the Arian Order of Architecture, as exhibited in the Temples of Kashmir"; therein the architecture of Cashmere is identified, in many of its details, with the Greek.

London in 1862 I read a Paper here on Indian architecture,* in which I stated that the capitals were Corinthian; I exhibited at the time the section of a frieze, and affirmed that it was sufficient in itself to establish the classical character of the architecture. The year following I visited Cashmere, and these conclusions of a Greek influence were confirmed by finding traces of Doric, and also of what I took to be Ionic, but of this last I did not at the time feel quite so certain. References to these will be found in my Paper above referred to. In the Lahore Museum there is the base of a column found in 1864 at Shah-ki-dera, the site of the ancient Taxila, on the east side of the Indus, and it is so purely Greek that its character cannot be doubted. That these were not exceptional and isolated instances was at last fully established by the explorations in the Yuzufzai district, situated on the west bank of the Indus north-east of Peshawur. The explorations at Takht-i-Bahi, Jamal Garhi and other places in that region, which were carried on about ten years ago, resulted in the discovery of Corinthian capitals which brought conviction home to everyone. Numerous sculptures were also found in which the pose of the figures, as well as the treatment of the drapery and other details, bore clear evidence of an influence from classic Greek sources. These sculptures are now in the Lahore Museum, and they form a unique collection in connection with this subject.

These details of progress all refer to ground within what was the British frontier before the present Afghan war began. Beyond the frontier our knowledge was almost a blank. Afghanistan has not been a favourite country for travellers; very few have visited it, and this is the reason why we possess such scanty materials regarding its architectural remains. Masson is about our only authority, and his explorations were made to procure coins. I have seen the excavations which he conducted in the Jellalabad valley, and he does not seem to have made a single effort in any case to bring the architecture to light. He had been in Afghanistan for some time before 1834, and remained there till the first Afghan war, hence he must have been about ten years in the country.† At that period little or nothing was known of Buddhist architecture, and the character of the mounds was evidently an enigma to him. His drawings are so small that no details can be made out from them. His works prove that he was a person of considerable ability, and the great quantity of coins which he collected were of the highest value as bearing on the ancient history of the region. I may say that previous to the present Afghan war our knowledge of Indian architecture did not extend beyond the entrance to the Khyber Pass. Being conscious that such was the case, the chance of obtaining information on the subject, however small it might be, was one of the inducements which led me to follow our troops in the campaign, and I think I can place before you sufficient materials by which knowledge on this subject will be extended as far at least as the limits of the Jellalabad valley.

I joined the head-quarters of General Sir Samuel Browne's force at Jamrood on the 20th of November, 1878. On the road to this place, about half way from Peshawur, I passed Hari Sing ke Boorj, where there are considerable remains, in the form of mounds, of the Buddhist period. The Fort of Jamrood is, I believe, built over the remains of an old tope; and General van Cortlandt, who superintended the construction of the fort in 1837, tells me that it was built over an ancient mound. Lieut. Bartram, R.E., gave me sketches of some mouldings of the old masonry which he found projecting at one place through the later walls of the Fort.

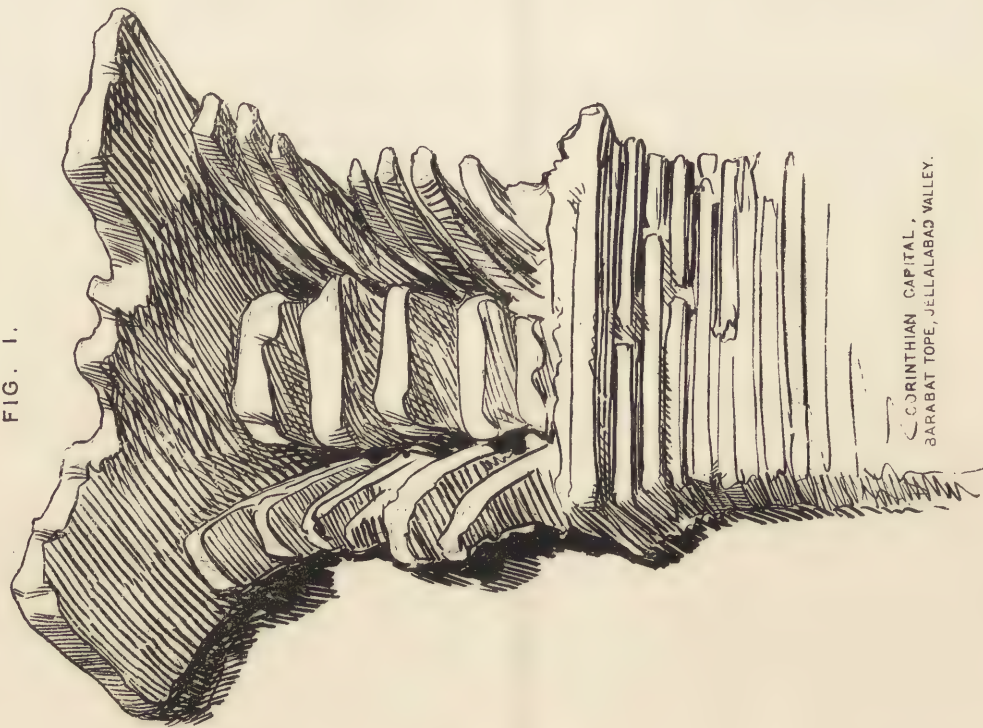
* See the TRANSACTIONS, Sess. 1861-62, pp. 174-5.

† Col. Yule states that Masson was little more than five years in Afghanistan.



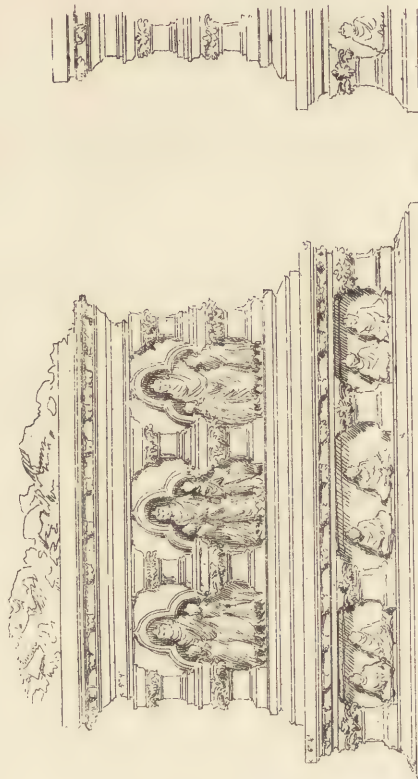
to face page 39.

FIG. 1.



CORINTHIAN CAPITAL,
BARABAT TOPE, JELLALABAD VALLEY.

FIG. 2.



BASES OF SMALL TOPE AT HADA, NEAR JELLALABAD.

FIG. 3.



BUDDHIST MASONRY, NEAR JELLALABAD.

William Simpson

On the morning of the 22nd November I climbed the steep ascent and entered the Fort of Ali Musjid with the General and his staff, and here for the first time I saw the peculiar kind of masonry which belongs to the Buddhist period in Afghanistan, and which I shall refer to as "Buddhist masonry." The part of the Fort which our guns had bombarded the day before was of late construction. The hill being partly isolated there is a long wall on its western side that our fire did not touch, and which is wholly of this Buddhist masonry. The character of this kind of building is so marked that it is easily recognized. Stones, more or less rudely squared, are placed at intervals, with slates built in between each stone; a continuous layer of slates is then made forming a course in itself, and on this is placed the next course of stones with slate between them again—the whole presenting the appearance of a diaper pattern.* What was the object of this peculiar kind of building is not at all clear. The only suggestion I can make is, that as earthquakes are not unknown in the region, it may have been adopted with a view to flexibility. I cannot say that this theory is a satisfactory one, but it is the only motive I can as yet suggest. There is an ample supply of slate in the mountains of Afghanistan, and this may have led to its use as a building material. The quantity of slate varies considerably in this Buddhist masonry, but it always forms by far the greater part of the superficies of the wall. In the Barabat Tope it is nearly all slate,† and I saw other walls of the same kind. At Chardeh there is a tope with only a small fragment of its masonry remaining, and in this the stones are neatly squared with no slate between; there is only a course of slate between each course of stone. This Buddhist masonry is found in the Yuzufzai country, but I have not heard of it on the east of the Indus, and I think it may be stated with confidence that this manner of building did not come from India. Sir Henry Rawlinson visited Ecbatana, in Northern Media, in 1838, and in describing its walls he says:—"The breadth of the wall is 12 feet, the outer facing being composed of hewn blocks of stone about 14 inches deep and 2 feet in length, alternating with thin stones laid edge-ways and perpendicularly between them; and the whole being fitted with extreme care and nicety."‡ I do not feel quite sure as to how these words ought to be understood, but they suggest a style of building wonderfully like the Buddhist masonry of Afghanistan. The mode of placing the thin stones between the larger ones may not have been precisely the same as that followed towards the Indus, and yet both may turn out to be only varieties of a masonry which was common to the whole region between where each is found. It was only the "outer facing" of the wall at Ecbatana which had this character. Sir Henry says that "the interior is filled up with huge unhewn blocks imbedded in a lime cement." It is the same with the Buddhist masonry, the outer surface only is built with it, the interior is formed of rude stones, often water-worn boulders, imbedded in mud, the whole forming a solid mass. These identities are very striking, and there is nothing improbable in the supposition that if such a mode of construction was common to the hill countries on the east of the Euphrates, where the material could be easily obtained, the style may have been carried as far as the Indus as early as the time of Darius, or at the date of the arrival of the Persian style of architecture in India. Careful inspection of ancient structures to the west and north of Kabul, if any exist, will be the only means of giving us safe data on this subject.

A peculiar manner of building does not necessarily change with the religion of the locality where it exists, and it is quite possible that the Buddhist masonry may not have altogether

* See pl. 1, fig. 3.

† See pl. 1, fig. 1.

‡ Journ. Roy. Geogr. Soc., vol. x.

ceased with the downfall of Buddhism. Although recognizing this rule, yet I should be inclined to the opinion that the Mahomedans did not continue the style in the Jellalabad valley or the Khyber Pass, and hence I take it that the Buddhist wall in the Fort of Ali Musjid is as old as the Buddhist period. Whether it was originally a religious establishment or a fortified position is somewhat doubtful. At Lundi Khana there is an old fortified place, all of Buddhist masonry, and in it there is no appearance of topes or viharas. It is high up above the Pass on a rocky height, perhaps 2000 feet above the road. The cliff is perpendicular on one side for about 400 or 500 feet, and a strong wall, nowhere less than 6 feet wide, runs along the steep slope on the other side, inclosing a narrow space all the way which is not over 30 feet wide at any part, and the greater part of it is not half of that width. There are the remains of a stair down the side of the cliff behind, where there are also some walls large enough to have formed a good house, and a communication existed to a small stream of water. There are the remains of a few houses on the crag above, but they are of the smallest dimensions, owing to the narrowness of the inclosed space. It is one of the most remarkable fortified places I have ever seen, thus to inclose for such a distance the topmost crags only of a high hill. I had some natives of the locality as guides on my visit, and I called the spot a "Buckra ke Killah," or Goat's Fort, a descriptive term which seemed to please them, and I repeat it here as it may convey some idea of this remarkable fortified eyrie. Its existence tends towards an assumption, which we need not reject, that even under the non-slaying teachings of Buddhism, there were dangers existing to life and property requiring places of defence, and it is quite possible that Ali Musjid was one of them. It is the real entrance to the gorge of the Khyber on the Indian side, as Lundi Khana is towards Kabul; and a fort at each end to command the Pass is so highly probable that we may almost take it for granted. Some small topes, as well as a fragment of Buddhist wall, were come upon on the ascent to Ali Musjid, but the existence of these are not incompatible with the theory that the walls on the summit belonged to a fortress. About half a mile lower down the Khyber stream, on a small hill overlooking it, were found the remains of a religious establishment, surrounded by a group of small topes of a very interesting character. These were explored by Mr. Beglar, of the Indian Archæological Department, and some very valuable details were brought to light. I have heard of other Buddhist remains near Ali Musjid, but I cannot speak of them as I have no details.

After passing the grand rocky gorge above Ali Musjid the Khyber Pass begins to open, and at Lalabeg it widens into a valley, with villages and flat cultivated land. It was when approaching this that I got the first sight of the Ishpola Tope. It stands on the summit of a mass of rock which projects into the valley, and our road passed close under it. The effect of this fine monument dominating over the plain, and surrounded with picturesque hills, is very striking. Its contrast with the mud villages of the present day tells as plainly as words could of a past when the country was in a flourishing condition, when there was wealth; and that art and architecture were then not unknown in the region. It may be stated here that, in the present day, Afghanistan has fallen low in these pursuits. Houses are formed of mud, and the carpentry of doors and windows is of the rudest description. I saw the ruins of a brick house at Jellalabad, but at present no structures seem to be built of this material. The walls of Jellalabad are all of mud, and the wooden gates would be sure of the first prize if it were

to be given for the worst kind of work. As for art there did not appear to be anything of the kind in the country. There are here and there a few Hindoos who make gold and silver ornaments, but their work is poor and of the coarsest character. I did not visit Ghuzni, where fine buildings have been erected since the Mahomedan period, but from Jamrood to Gundamuck there is not a vestige of architecture to be found dating since the worship of Buddha ceased. In the present day these attendants of civilization have simply become extinct, and have no existence even in their ruder forms. In such a country you can imagine the effect produced by the Ishpola Tope. I had no means of measuring it, but should say it could not be much less in size than the Manikyala Tope, which is nearly 130 feet in diameter, and to which it bears a closer resemblance than the topes in the Jellalabad valley. This results from the cylindrical portion of it being much less in height than those of the latter place. The dome is still nearly complete on the south side. It differs conspicuously from the Manikyala Tope in having a square base, which is one of the marked characteristics of the Jellalabad examples. This square base has 14 pilasters on each side. Three of the spaces between the pilasters are recesses in which I suppose there have been sitting figures of Buddha. At the north-east corner there is a retaining wall, which is a good specimen of Buddhist masonry, made to support the monument on that side, where the rocky surface is lower than in the other corner. The capitals of the pilasters are Corinthian. There are no pilasters on the circular part of the Tope. On my return from Gundamuck in June I made a second inspection of the remains, and found that some one had made excavations. The stair which led up to the top of the square base, was partly cleared; it approaches from the north. Round the lowest member of the base had also been exposed a continuous row of small sitting Buddhist figures about 18 in. high, placed so close that they touched each other. The remains of the vihara were quite distinct on the side of the hill behind, in some parts the walls stood a considerable height above the ground. In one or two places I noticed the circular courses of the masonry of small topes, one of which was about 6 feet in diameter. One of the villages near to the Tope is built on the remains of Buddhist walls, but what the place had formerly been it was impossible to determine.

At Lundi Khana there are remains with Buddhist masonry on each side of the pass; and in the valley leading to Daka from Lundi Khana, which is generally included as part of the Khyber, there are other similar remains, but I was not able to inspect them sufficiently to be able to say what they are. Near Hazar-Nao, and close to Basawul there are isolated hills covered with fragments of walls and quantities of débris, which I have no doubt belonged to the Buddhist period. At Chardeh there is a prominent hill overlooking the plain, with the remains of a tope upon it. I went up in passing and made sketches of this place. The tope is only a rude mass of masonry, all its outer surface has fallen away, and I only saw one or two stones of the external surface remaining. These I have already referred to as one of the varieties of Buddhist masonry, the stones having been squared and touching each other on their perpendicular surfaces, but the courses are separated by a layer of slates between, which will be understood when I say it produces a streaked effect, instead of the diaper pattern of the usual Buddhist manner of construction. There are what I take to be the remains of the monastery on the north and south sides of the tope, and among those on the south I could distinguish the plan of some of the cells, small places not over 8 feet

square. The hill is so narrow on the summit that the base of the tope entirely covers it, and the buildings on the north had to be supported by a very high retaining wall, which is still in very good condition, and is, I should say, the finest specimen of Buddhist building I saw in Afghanistan. Here, as well as at Ishpola, I could see rude caves in the rocks around—those at Ishpola seemed to be natural recesses on the face of the rock under the tope, and were just the kind of places an Oriental ascetic would choose to live in. My notion was that they were older than the topes, and I venture the suggestion that the monasteries at these places may have resulted from the fame for sanctity acquired by some early resident giving a reputation to the spot. Ishpola is probably an old name, but Chardeh is Persian, meaning the "Four Villages," the original Buddhist name being lost—this I am sorry to say is what has occurred with almost all the Buddhist places in Afghanistan. It is much to be regretted, for names often give a clue to the character of remains, and now that we have the travels of the Chinese pilgrims to refer to, the names would have been invaluable as a means of identification with the localities described by them.

Although much obliterated, the old path up to the Chardeh hill is still visible, and at its foot there is the ziarat of Peer Kamil Baba: that is, the tomb of a Mahomedan saint, it being one of the most marked customs of the Mahomedans of Afghanistan to go to the tombs of their saintly men for purposes of prayer. These shrines are made of mud, often decorated with white pebbles, and their existence can be detected from a distance by a long pole and a piece of coloured cloth on the end of it. I was struck in this case to see the Mahomedan to-day saying his prayers at a tomb, with the old tope or relic shrine above, where the followers of Buddha performed their devotions, showing, though new teachers may appear, and creeds may differ, that "Tomb-worship," one of the oldest forms of religion, remains the same. I also noticed here the beautiful view from the hill on which this monastery stood, and I found it the same with the sites of monasteries in the Jellalabad valley: they were all on commanding eminences overlooking the level plain, and giving a pleasant look out on the mountains around.

The march from Chardeh brought us to Ali Bogan, at the eastern end of the Jellalabad valley, and the next day, the 20th December, we went on to Jellalabad, remaining there in camp till the 12th April. It was the long stay at that place, resulting from a lull in the operations, which enabled me to visit nearly all the remains, and at the same time to carry on explorations at one or two of them.

The valley is about nineteen miles from east to west, a lateral group of hills at Girdi Kas separating it from the plain of Chardeh on the east; the Sia Koh Range forming its western barriers, to the north-west of which is the district of Lughman. Away to the south is the Suffaid Koh Range, with its long line of snowy peaks, and on the north is the remarkable and beautiful mountain, called the Ram Koond, which was white on its summit during the most of our stay. If the Jellalabad valley had more trees and cultivation, which I believe was its condition in the days when Buddha was worshipped there, it would be one of the loveliest spots on earth. The quantity of Buddhist remains is one of the reasons why I suppose there must have been more of the soil cultivated in former times than now. The population of monks who lived in these places must have outnumbered by many times the present inhabitants, and this implies a larger food supply. The construction of the monasteries,

with large and costly topes, all tell of a wealth which is no longer to be found there, and their decorations are evidences that art was practised. We know from the Chinese Pilgrim, Fah Hian, that there was a monastery at Hada "entirely covered with plates of gold."* The seven precious substances are constantly mentioned as the decorative materials of the structures. These were gold, silver, lapis lazuli, crystal, cornelian, coral and ruby. Precious and veined stones were also used. I found some remnants of gilding, which is confirmative so far of these accounts. From what I have myself seen I should say that most of the buildings were thickly coated with plaster, and decorated with bright colours—red and yellow being the predominating tints. Hiouen Thsang describes a tope at Nagarahara, the then capital of the district, as being 300 feet high, which was not only remarkable for its construction, but also for the sculptures upon it.† The same author, in describing the Amaravati Tope, makes a reference in connection with it to "all the magnificence of a Bactrian palace,"‡ showing the celebrity the region west of the Indus held in those days. You can imagine the appearance of this splendid valley when it was bordered all round with large monasteries and topes, decorated with such costly ornaments. Some of the topes were erected on spots where it was believed Buddha had visited, others were built in honour of relics. One in the town of Nagarahara contained a tooth of Buddha; one vihara had the staff of Buddha, and another had his robe. Perhaps the most celebrated of all was the one at Hada, where the skull-bone of Buddha was preserved and worshipped. It was the vihara containing this relic which has been already mentioned as having been covered with plates of gold. From Fah Hian's description it must have been a very wealthy establishment. The king and his nobles came every morning to worship the relic, and men sold flowers and incense at the gate to those entering to perform their devotions. A visit to this shrine was expensive. Hiouen Thsang paid 50 gold and 1000 silver coins, besides presenting silk banners and dresses for the monks.§

This place is 5 miles south of Jellalabad, and it retains its old Buddhist name; on the old maps it appears as Hidda, but in the new survey it will be given as Hada, which is nearer to the present pronunciation of the word by the natives. Hiouen Thsang describes it as being about four or five *li* in circumference, which is about a mile.|| Judging from the remains as they exist to-day, this is an under-estimate of its size. There are a number of level-topped heights and ridges all covered with the remains of topes and viharas. The rock is conglomerate, and wherever it is scarped there are caves, forming what must have been a sort of underground town in addition to the one above. There are also subterranean channels for water cut in the rock. On all the heights round there are also remains in the shape of mounds, with caves in the rock below. The topes and rectangular mounds,—this last form indicating that they were viharas,—as well as the caves, show that this extensive place had been in itself wholly a town of Buddhist ascetics. About a mile south of Jellalabad there is

* Beal's Translation, p. 41.

† This was the Memorial Tope of Dipankara, Julien's Translation, vol. i. p. 97.

‡ Vie de Hiouen Thsang, Julien's Translation, p. 188.

§ Mémoires par Hiouen Thsang, vol. i. p. 78. Hiouen Thsang also states that "Ceux qui veulent voir l'os du sommet de la tête de *Jou-lai* (du Tathágata) payeront une pièce d'or; mais, pour prendre l'empreinte de l'os, ils en donneront cinq."—Julien's Translation, vol. i. p. 104. It is also recorded that it was equally necessary to pay in proportion to see the other relics. The sum mentioned in the text, as well as the presents of silk banners, &c., were for permission "d'adorer toutes ces reliques."

|| Ibid, vol. i. p. 102.

a low ridge of heights extending as far at least as Sultanpoor, a distance of seven or eight miles. The whole length of this is covered with remains, and when the structures existed it must have had the appearance of a continuous town along all the extent of this space. The base of the Siah Koh towards Darunta, where the Kabul river enters the valley, is covered for about three or four miles with the remains of topes and the mounds of viharas. Opposite the junction of the Surkhab, that is on the north bank of the Kabul river, is a large cave known as the "Pheel Khana," or the "Elephant House," which gives its name to a large group of topes and caves. These extend on the heights as far east as the Barabat Tope, a distance of about two miles. On the Jellalabad side of the river are the remains of what I consider to be the site of the ancient capital, known in the Buddhist time as Nagarahara, where there are so many mounds of stones that the natives call it Wuttapoor, or the "City of Stones." All along the projecting spurs of the hills on the north side of the river, as far as Mirza Kheyl and Girdi Kas—at this last there are remains on an island with a tope—are masses of débris which I could distinguish from below, but as I only passed along there on one occasion, during an expedition against the Momunds, who occupied one of the eminences covered with ruins, my knowledge of these places is not so complete as it is of the other localities.

From this slight sketch of the extent of the Buddhist remains it is possible to form some notion of what the Jellalabad valley was when "the land glittered with the yellow robes" of the ascetics who dwelt there. At the present day nothing is left but mounds, and here and there a tope, which, although dilapidated and fast passing to the mound condition, still has some architectural features remaining. The heaps formed by the topes and the viharas* are tolerably distinct, the one being a rounded knoll and the other a hollow square. In many cases the centre of the square and the tope are on a straight line, showing a symmetry in the design. The Ahin Posh Tope was not arranged with its vihara in this manner; its square base is on the lines east, west, north and south, and my impression is that most of the Jellalabad topes are so placed, but there seems to be no rule as to the orientation of the approach. The Ahin Posh Tope had stairs on each of its four sides, a tope at Gunda Chismeh had its approach from the north, and that of the Ishpola Tope was the same; the Khaista Tope had its stair on the east, and in a small tope explored at Hada the stair was on the east. The group of small topes explored by Mr. Beglar at Ali Musjid are placed round a quadrangular building, and here the approaches are parallel to the side on which the topes are placed, showing I think that the Buddhist devotees were indifferent on the matter of the "eastern position." Under the projecting knoll on which the Khaista Tope stands there yet remains some of the Buddhist masonry of a tank about 300 feet square, so perhaps the approach to this tope was made with some reference to this particular feature. The principal approach to the inclosure of the Ahin Posh Tope was from the south; close at hand in this direction there is a slight hollow, which I suspect has once been a tank, and that it was this which determined the position of the gateway. Water is now brought close to this tope by means of a *karaize*, a peculiar kind of underground aqueduct to be found all over Afghanistan, and by which water is brought great distances, but whether they are as old as the Buddhist period or not I have no knowledge. If this means of water supply did not then exist the monks at

* Vihara means "monastery"; being the name given to the buildings in which the monks lived. These places were also called "sangharamas." In Tibet at the present day a Buddhist monastery is called "gonpa."

Ahin Posh must have carried their water for about a mile at least, an arrangement which, from what I have seen at Ajunta and other sites of Buddhist monasticism, I should hesitate to accept.

Masson counted the topes in the Jellalabad valley, and gives the result as a definite number. Here I think he made a great mistake. He only included those on which he found fragments of their structure remaining, for he made an imaginary distinction between topes and tumuli. He was not acquainted with the Buddhist system, and that the ascetics had viharas or monasteries in which they lived, hence his being unable to separate the mounds formed by these buildings from the mounds of the topes. This is the reason that there are yet in the Jellalabad valley the remains of topes in the condition of mounds, which escaped the operations of his industrious activity. The Ahin Posh Tope which I explored might be described as a second class one as to size, and being apparently only a heap of earth he never touched it. On the site of the ancient Nagarahara is another one of the largest size, but it presents only the appearance of a mass of water-worn stones, and thus it escaped his attention. Had he excavated for the architecture he would not have attempted an enumeration of the topes. As I have just stated there are large topes which he did not include, and I believe there are monuments of this kind of every size, some being only a few feet in diameter; and such has been their quantity that, even when they were perfect above ground, it would have been a long piece of work to have determined the exact number, and now it is impossible. Every monastery in addition to its larger tope, had numerous small ones of various sizes. We subscribed a few rupees and had a small exploration carried on at Hada. This was close to one of the larger topes which had an extensive chasm in its side—most probably made by Masson; our operations did not extend over a great space, still we cleared out part of what had been a tope 29 feet in diameter, and it was surrounded by a series of smaller topes, about 4 or 5 feet in diameter.* Here we found some interesting fragments of sculpture; the quantity of plaster figures embedded in the earth, and close to the surface, was a matter of surprise to us all.

It may be as well to explain what a tope is; its genealogy may be thus given:—The primitive grave heap became a mound; stones were added, producing the cairn; the stones of the cairn, arranged in various ways, at last were built into a structure. From this result most probably grew the seven storeyed tower of the Euphrates valley, the pyramid of Egypt, and the Buddhist tope.† It will thus be seen that the tope belongs to an ancient and a most important branch of architectural development. In the north of China the heaped-up conical mound of earth is still the form of sepulchre followed; and that of the Emperor Yung-lo, the most important of the Ming tombs, north of Peking, of which I laid plans before the British Architects in December, 1873,‡ is a large mound, half a mile in circumference, partly built all round with a wall about 20 feet high, giving us an approach to the tope. I mention this as showing the possible transformation from the mound into a wholly-built structure, for we have as yet no reliable evidence as to what the tope was in the pre-Buddhist time in India. Whether

* In pl I, fig. 2, is a drawing of the base of one of these topes; two of them were cleared out, but the mound extended beyond where there is no doubt a third. The circular part of the monument does not remain; in this case stone had been largely used, but the whole is covered with plaster, on which are the remains of gilding and colour. The resemblance of this to an early mediæval tomb was striking when it was brought to light, and the drawing has suggested the same identity to all who have seen it at home.

† The Chinese pagoda, or storeyed tower, is again most probably a derivative from the tope.

‡ See the TRANSACTIONS, Sess. 1873-74, p. 33.

topes existed or not at the date of Nirvana we cannot tell. Buddhist tradition indicates that they were constructed at that epoch, but that is not a reliable basis to use alone as a foundation for theory. At the time of Asoka, which according to the accepted chronology is about three centuries after the death of Buddha, these monuments appear as being regularly constructed after an established style of architecture. At that date in India they were solid hemispherical domes, surmounted by a *tee*, over which were placed the symbolical umbrellas. The one at Sanchi, known as the Bhilsa Tope, is perhaps the best example to refer to. There is a small model of this monument in the South Kensington Museum, but it is to be regretted that it should be incomplete, as it wants the *tee* and the umbrellas. On the east of the gates, exhibited in the same room, sculptured representations can be seen with all these details. The Manikyala Tope in the Punjab, already referred to, is another illustration of the hemispherical form.

On crossing the Indus a marked peculiarity appears, and that is the existence of a square base. In the Sanchi Tope there is a circular ledge 14 feet above the surface, with stairs leading up to it, showing that it related to some function at the ceremonies. At Manikyala this feature is very prominent; it is approached by four broad flights of steps from the four cardinal points. There are the remains of some smaller topes at this place, and two of them, known as Makam-ka-Pind and Sonala Pind, had each a square base. In the Yuzufzai country there are the remains of a tope with a round base at Jamal Garhi, and one with a square base at Takht-i-Bahi. After entering the Khyber the circular form disappears, and in every case, so far as I could judge by what I saw, the square base was the rule.

This square base seems to me to be a very important feature of the tope in the Indus valley and Afghanistan. There must have been some influence from which it originated, and if this could be followed up and the sources explained from which it sprung, a new light might be brought to bear on a subject about which we are much in the dark. Although not in the direction here indicated, suggestions have been developing themselves from this architectural feature. In connection with the Buddhist remains of Afghanistan, I have elsewhere pointed out that the chortens or topes, erected by the Lamas or Buddhist monks in Tibet, have a square base, which is a very prominent feature belonging to them. I pointed out what is highly probable, that they derived this form from Afghanistan, or as I expressed it—"from the right bank of the Indus and not from the left." There was added the suggestion that this might prove important as showing the probability of the Buddhist propaganda having first crossed into Afghanistan before it penetrated into Tibet. What is here hinted at as only a possibility, resulting from a peculiarity of architecture, Colonel Yule confirms as being perfectly historical, and I am indebted to that gentleman for some references on the subject. They are from Koeppen, who states that the first Buddhist king of Tibet was Srong-tsan-Gampo, who in 632 A.D. began the work of conversion and establishment. He sent his minister Thu-mi-Sambhola with sixteen companions to India to bring back books and doctrines. It is not stated to what part of India they went, but Koeppen says that "Tibet received its Buddhism especially from regions in which this cultus,"—that of Avalokitésvara,—“flourished, such as Kashmir, Nepaul and Udayâna.”* This Udayâna is a region on the right bank of the Indus between the Khyber and Cashmere, the present Swat and

* Vol. ii. p. 61.

Yuzufzai country. The same author also adds that Padma Sambhava, who is still the most famous apostle of Buddhism in Tibet, came from Udayâna in the eighth century. In stating these matters I am not forgetting that missions were sent out from India at the close of the third Synod, in 241 B.C., to the Himalayas, as well as to Gandhara and Cashmere. Whatever these missions may have done, they did not take designs for topes with them from Pataliputra, or, if they did, they were not followed in Tibet. I think that, as the Indus valley was a more constant route of communication than any other point in the south-east of the Himalayas, the connection between Udayâna and Tibet would be kept up better through this line, and here apostles, doctrines and architecture would naturally pass. The date of Srong-tsan-Gampo was the very time when Hiouen Tshang was in India, and talking of the magnificence of Bactrian architecture as far south as Amaravati. The most splendid tope in India at that time was at Peshawur. The Peshawur valley was full of viharas and topes, and the fame of these monuments would be enough in itself to carry the style of architecture into new regions where it was desired.

I have already mentioned the mound graves of Northern China, and an idea has suggested itself to me about them in relation to the square base of the topes. Under the conical heap of earth the Chinaman forms a square base of the same material. The square form is *Yang* and the round heap is *Yin*. These form a dual power of profound symbolic significance in Chinese ideas. Whether these ideas extended westward or not I cannot tell, though I think that sepulchral mounds exist all through Tartary; but if the square base of the Chinese grave could be traced towards the Hindoo Koosh, the origin we seek would be explained. The Turanian invaders, the Su and the Yuchi, who overthrew the Greek rule in Bactria, and under whom Buddhism flourished in Afghanistan, may have brought the form and constructed it with the prevailing style of architecture in the locality.

The word "tope" is understood to be derived from the Sanscrit of *stupa*, the *S* having been dropped out. The term was first used in reference to the Afghanistan monuments, from which region I think the word came. Masson uses "tappa" as an Afghan name in relation to both topes and mounds, and my working parties of natives seemed familiar with it. The Turkish word "tepe," which is applied to all mounds natural or artificial is so close upon this that it raises a question of identity. From as far west as the Troad to the east bank of the Euphrates this Turkish term may be found, and I suspect that "tappa" is only the same word, but I cannot pretend to determine the point. The Afghans have another title for all mounds or heaps; it is "goondi." As an example, the remains of a tope on the site of the ancient Nagarahara, already mentioned, they call "Nagara Goondi," which becomes in itself one of the identifications of the place.

As it became evident we should have a long detention at Jellalabad, I felt a strong desire to explore some of the mounds; and on making known my wish to the late Sir Louis Cavagnari, he at once placed a working party of Afghans, people belonging to the villages around, at my disposal, on condition that all sculpture or coins found should belong to the Indian Government. There was too much work going on in the camp, and on the roads of communication, to allow of an engineer officer being spared to take charge of the workmen, but a havildar of the Corps of Guides, named Kalah Khan, who had at one time served in the Sappers, acted as overseer. He could speak Puchtoo, the language of the country, and he

performed his duty in this case very well. About a mile from the camp, at the eastern end of a long line of heights to the south of Jellalabad, and which I have already described as being covered for many miles with remains, is an important group, with a prominent mound known as the Ahin Posh, or the Iron-clothed, Tope. Along with it are the rectangular ridges of the vihara, in which vestiges of Buddhist masonry can be seen in many places. This was the spot selected for exploring.

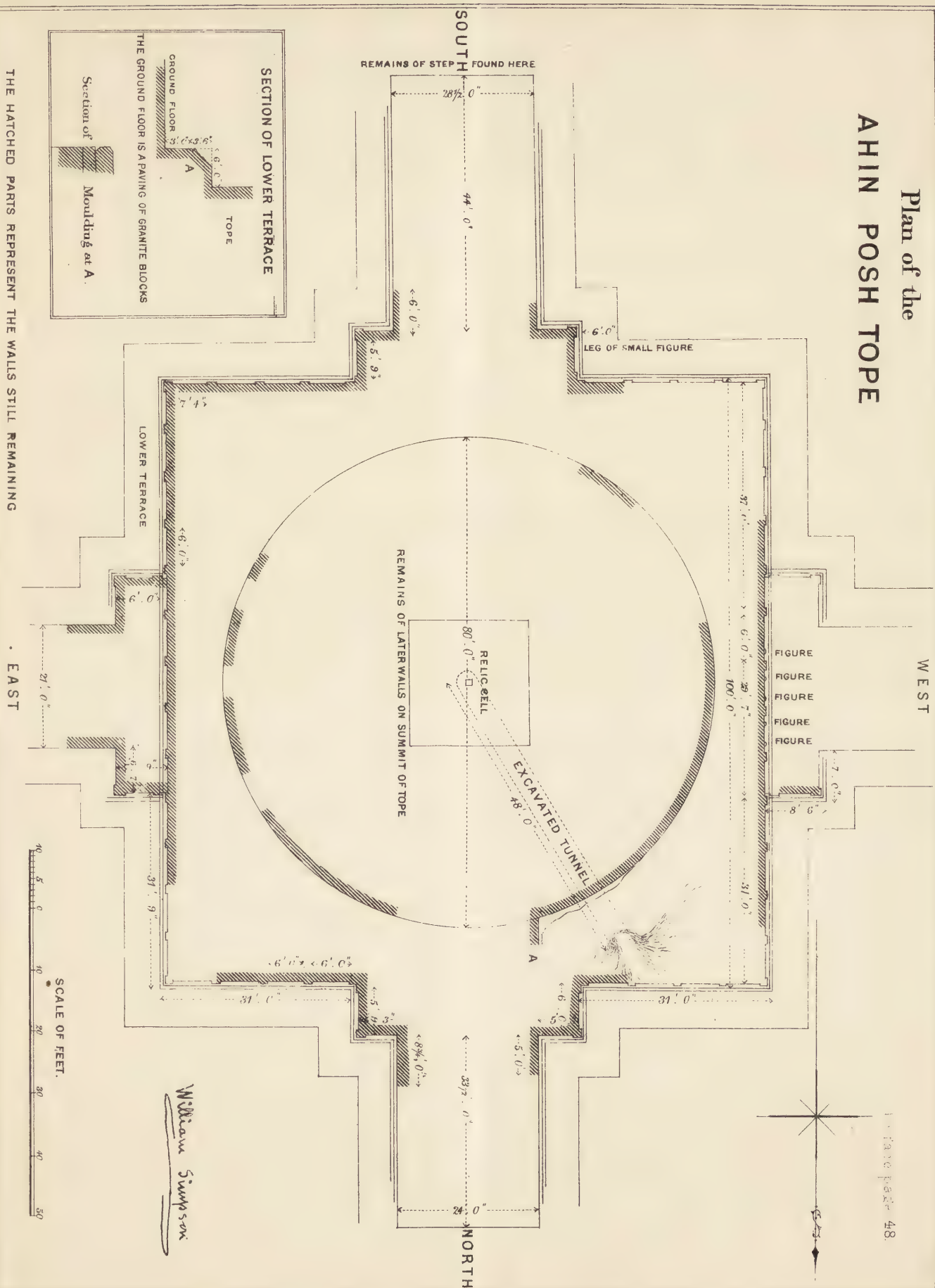
The first operations at the Ahin Posh Tope were made at my request by Lieut. The Honble. M. G. Talbot, R.E., who was at work making the South Hill Fort, a defensive work close by, from which he detached one or two of his sappers. The result was the discovery of fragments of one course of Buddhist masonry belonging to the circular part of the Tope.* On finding this, there was some doubt as to whether it was the upper portion we had come upon, from which the dome was sprung, or the first course resting on the platform of the square base. Previous to this there had been some uncertainty as to whether it really was the remains of a tope or not, for no masonry was visible; it was only a rounded mound of earth and stones. Here and there I could see that the boulders of which it was built were visible in layers, and this, although not conclusive, owing to my then limited experience, went a long way to satisfy my own mind. The few stones which were found left no doubt as to the character of the remains. When I began with the regular working party the first day's operations showed what I expected: that it was only the lowest course of the circular part that had been come upon, and consequently that all the upper portion of the monument had ceased to exist. This I confess was disappointing so far, but still I felt sure that some of the base would be found, and to obtain the details of this part of the monument was a sufficient motive for going on with the excavation.

I began a tunnel at once so as to penetrate to the centre of the Tope, and commenced it in a line from the north-west. This was to avoid coming upon the central part of the square base—should any of it chance to exist. There was enough of the circular course above from which to determine the diameter, and the measurements gave it so near to 80 feet that I put it at that figure, as being sufficiently close to represent its size. This makes 40 feet to the centre, and then there was a portion of the square base also to cut through. As I drove the tunnel ultimately a few feet beyond the centre, its full length may be put as close upon 48 feet.† The tunnel had to be made high enough for a man to walk erect, and wide enough for the carrying out of the stones. One man only could work at the end, extracting the stones, which he did with a crowbar. These were all water-worn boulders, the largest being about a couple of feet in size; embedded in mud, the whole formed a compact mass so firm that no supports were necessary while making the tunnel. The boulders were to a certain extent built in layers. I had noticed in those topes formerly explored that the tunnel had been commenced rather high up, and a descent had to be made; seeing the trouble this would give the men in bringing out the débris, I determined on first finding the lowest course of boulders and making the original surface of the ground the floor of my tunnel. This turned out to be a fortunate plan, for it led me direct on the central cell, which had been constructed on this level.‡ There was

* See the plan on pl. II.; and also the sketch on pl. III. fig. 1, at A.

† See pl. II.

‡ See pl. III., figs. 1 and 2, for level of cell. It was $2\frac{1}{2}$ feet above upper moulding of square base, or 12 feet 2 inches above the ground floor of the Tope.





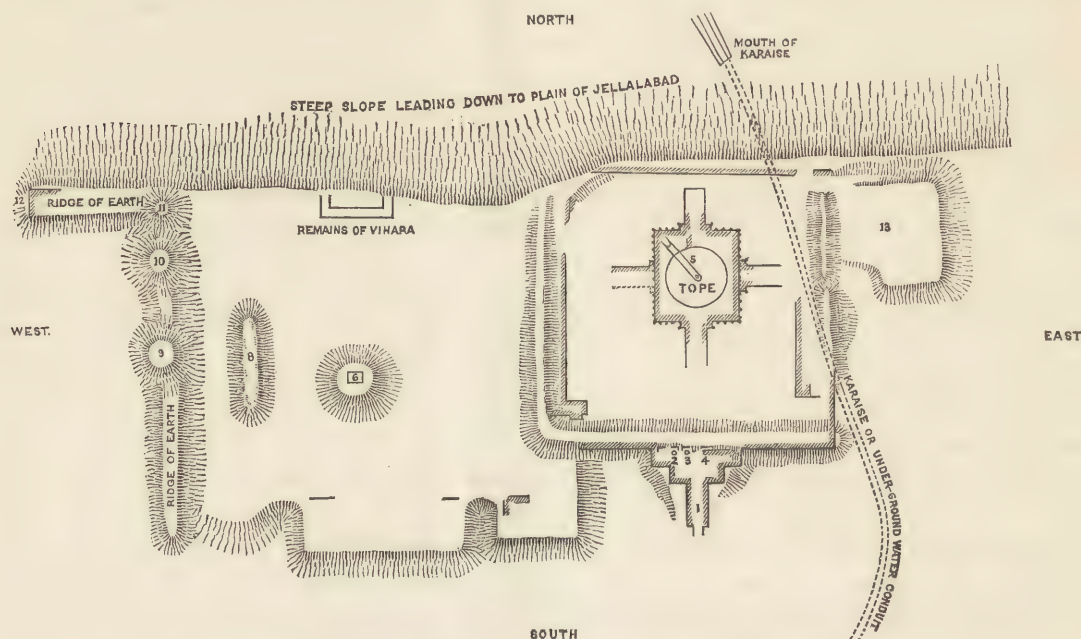
no variety in the manner of building, and when at last it was reported that some slates were visible I knew it was the cell which had been come upon. Being anxious to understand the arrangement and construction of this part of the monument I remained in the tunnel while the stones were removed on each side and beyond the slates; and it was only after the space was cleared out, and the part containing the cell could be seen all round, that I began to open it. It formed an oblong heap, quite rude externally, about 4 feet long and about 3 feet wide. On the top was a large slate extending to nearly these dimensions, and about 1 inch thick. On being raised it was found embedded in mud, with another slate slightly larger in size under it. On raising this last the cell was disclosed; it was a cube of 16 inches, formed of small slates about 6 inches long and half an inch thick, and their edges, which formed the surface of the cell, were smoothly trimmed, but not polished. They were placed very regularly, so that they formed a very well made receptacle. The bottom was formed of another large slate. I had expected to have found a vase or jar of some kind containing the relics, these having been repeatedly found in topes; but there was no other inclosure than the cell which I have just described. In this instance there were about two handfulls of dark brown dust, which I presume was part of the ashes of the person in whose honour the monument had been erected. On the ashes lay a golden reliquary set with stones, and this was about 4 inches long and an inch wide; it was octagonal in form, and had two bulbous projections, with holes for the cord by which it was worn round the neck.* One end came off, and within was a small hard substance, which may have been a relic; there were also two gold coins in it—that being all it contained. Among the ashes I found eighteen gold coins, making a total of twenty. They were all about the same size, slightly less than an English sovereign, and weighed about two drachms each. Seventeen of them belonged to Indo-Scythian monarchs, extending over three reigns, that of Kadphises, Kanerki, and Hverki. The other three were Roman coins belonging to Domitian, Trajan and the Empress of Hadrian. The reign of the first of these Indo-Scythian monarchs is generally given as during the century before Christ. The Roman coins come down to the first quarter of the second century of our era, and are of value as giving the limit of possible antiquity to the monument.

The making of this tunnel took nearly a month, and while it was going on the larger number of the working party were clearing out the base of the Tope. I had commenced the excavation on the west side, and found that it originally had 14 pilasters. At the corners none of the base existed, except at the south-east corner, but towards the middle it still remained about 15 feet high, with portions of eight pilasters.† I was able to make a section of the base mouldings, as well as of the base of the pilasters. I regret to say that in no instance were the capitals left, the pilasters being all destroyed to a point below that member. The Tope had been originally constructed with stairs on the south and north, but at some later period similar stairs had been added on the east and west. These were identical in plan with the first stairs, and when I came upon the remains of the stair on the west it was the cause of great perplexity to my mind. I only found the northern portion of its wall, built up against the built square base of the Tope; the pilasters had been covered up without destroying them, and as there were five sitting Buddhist figures found on the upper part of the base mouldings, the natural conclusion at the moment seemed to be, that it was an inclosure forming a shrine;

* See pl. III., fig. 4.

† See pl. III., fig. 2.

the absence of the inner face of the wall being what I could not understand. Further explorations made it all clear. As was their manner, they built the outer facing of the stairs and filled up the whole space with boulders and mud, covering up the pilasters and figures within. The masonry was different from that of the rest of the Tope, and the junction of the new work was irregular,—a small space being left between the pilasters at the junction, which does not exist at the north and south stairs. I cleared out almost all round the square base; it was exactly 100 feet on each side. The corners had suffered most from dilapidation, and the south-east corner was in the best condition; at this point a small portion



SKETCH-PLAN OF AHIN POSH TOPE AND MOUNDS OF VIHARA.

5, Tunnel into centre of Tope; 1, remains of principal gateway and approach from south; 2, 3, 4, remains of colossal figures in plaster; 6, mound of stones and mud in centre of Vihara; 8, 9, 10, 11, 12, mounds and ridges of earth, which seemed to be remains of a village built on old walls of monastery; 13, an inclosure formed of mounds. Round the Tope are remains of the Buddhist walls, partly explored. The *karaise*, or water conduit, on the east, is at least some 20 or 30 feet below the surface of the court in which the Tope stands.

of the lower part of the base existed, it having entirely disappeared from the other corners. The Tope was faced with the usual Buddhist masonry and thickly coated with plaster. I feel sure that it has been decorated with colour, but cannot affirm that any of it existed, except on one of the figures found on the west side, where there are distinct remains of a bright yellow colour, which may be taken as evidence that this was the colour of the Buddhist robes in that part of the world. On the western side of the south stair were the remains in plaster of the legs of a small standing figure; beyond this, and the other five figures on the west, I was no other evidence of similar remains on what is left of the Tope.*

My reason for beginning the excavations on the west side was because I thought that

* See pl. III., fig. 3, which gives one of these five figures. It is about 3 feet high, and the nimbus is in form of a lotus leaf.

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FIG. 3.



BUDDHIST FIGURE IN PLASTER ON WESTERN BASE.

THE AHIN POSH TOPE.

FIG. 4.



FIG. 1.



THE AHIN POSH TOPE NEAR JELLALABAD.

William Simpson



the principal approach would be there, owing to the remains of the vihara being in that direction. There is a rectangular ridge round the Tope, which had formed an inclosed court, and to the west of this is a larger rectangle, full of mounds, which no doubt was the monastery.* Here I regret to say time did not permit of excavations. I managed to clear out some portions of the rectangular ridges round the Tope, and came on the remains of the entrance on the south side, suggesting that the principal gate was for the public, and not exclusively for the monks who dwelt on the spot. The approach is on a line with the axis of the Tope, and it must, from the plan, have been a place of some architectural pretensions; this conclusion was confirmed by the discovery of portions of colossal figures. The best preserved of these were two human feet *in situ*, each of them being 23 inches in length; they are modelled very beautifully in mud, and covered with fine chunam. I regret exceedingly that, owing to the material, they could not be preserved. The position of the feet shows that the figure stood facing the worshippers as they advanced towards the shrine. The probability is that this court round the Tope contained smaller shrines with figures in them, an arrangement which we see in the plans of Tahkt-i-Bahi and Jamal Garhi.

There are the remains of a square tower built at a late date on the present summit of the Tope,† and modern walls of rude masonry, not Buddhist, have been constructed all round the old line of the court inclosing the Tope. On the northern side this more modern wall is built directly on the Buddhist one, but on the south it is neither on the old wall nor is it quite parallel to it; from this the conclusion is probable that the whole place was in ruins when the later erections were made. On the north there is the steep bank down to the alluvial plain of Jellalabad, where the débris of the first structure on that side has fallen, thus leaving the wall visible to use as a foundation; on the south a ridge of rubbish was the result of time, and the later builder began his wall on that, and hence his deviation from the old line. These later walls were no doubt the work of some Afghan chief, who had made the place into a stronghold, and as very little of it remains it may have been excavated centuries ago; the supposition is that if he wore some particular kind of armour, this perhaps may have given the name of "Ahin Posh," or "Ironclad," to the spot.

There is a very tempting mound at a village called Gunda Chismeh, which is on the same ridge of heights, about a mile to the west of the Ahin Posh, and to this I removed the working party. Although unsuccessful so far as the finding of coins or relics is concerned, yet it was fortunate that I explored this tope, for it revealed to me a feature which might have been otherwise overlooked. At this monument there exists a terrace, 4 feet wide, and 3½ feet above the ground floor, faced with small pilasters, which goes round the whole of the square base, following exactly the outline of its plan.‡ On finding this at Gunda Chismeh, I sent back some of the men to Ahin Posh to see if such a terrace existed there. Although they excavated for a couple of days, no trace of it could be found, and the search was given up. It turns out that the terrace does exist. After our advance to Gundamuck, the Sappers followed us, and on their arrival Lieut. Bartram, R.E., brought me a section of it.§ It chanced that Dr. Amesbury, who was attached to the Sappers, made some excavations at Ahin Posh after I left, and he came upon the terrace by accident. On my second visit to the

* See woodcut, p. 50.

† See pl. II., on plan.

‡ See plan of Gunda Chismeh Tope on pl. IV.

§ See "Section of Lower Terrace," pl. II.

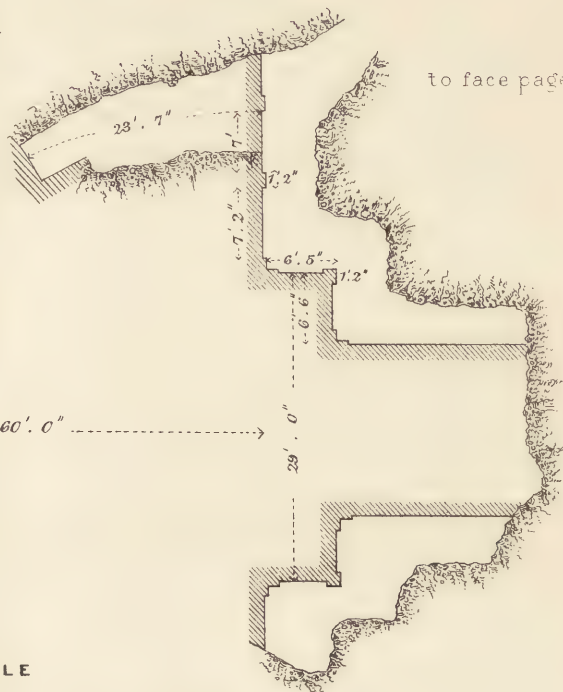
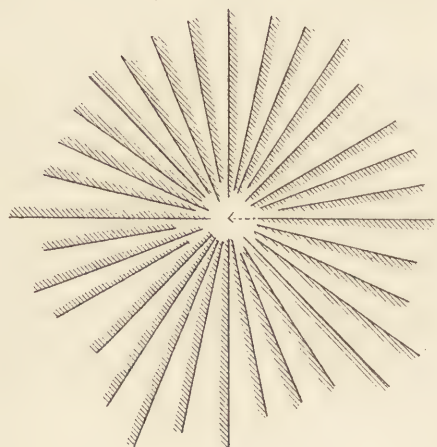
Ishpola Tope, I naturally looked for this feature, and there is a space round the square base of it, quite wide enough for such a terrace. In the smaller topes explored by Mr. Beglar at Ali Musjid, the repetition of this terrace is visible, although too small to have served for any use,—still this is evidence that it formed a part in all the designs of these structures in that part of the world.

Such being the case, the question naturally arises, for what purpose was this terrace used? I have not chanced to come across any effort to explain the purpose of the circular ledge with its stairs, which belongs to all the Sanchi group of topes, and which may be considered as the counterpart of the floor of the square base of the Afghanistan examples, so that the question here put, involves the object of this part of the Sanchi examples as well, and so far as I know it is probably quite a new one. The Afghanistan topes seem to have had no railing round them, such as we find at Sanchi, Bharhut and Amaravati, and it may be presumed that the lower terrace represents that feature, and its understood purpose was for the worshippers to circumambulate the shrine while doing their *poojah*. This still leaves the large space of the square base unaccounted for, and its importance, from the large stairs leading up to it, shows that it was connected in some way with the ceremonies. If the size of these topes did not tell us, we might infer from the arrangement of the chaitya temples of the rock-cut caves, that they were the high altars, or cathedral churches, of the Buddhist system; consequently, there would be some form of elaborate service performed at them. My opinion is that the monks sat on the square base chanting from the books of ritual, accompanied with musical instruments of various kinds; Fah Hian mentions the use of great drums, conches and cymbals at Hada.* It is also quite possible that the worshippers may have circumambulated the place first on the lower terrace, and then finished their *poojah* by doing the same on the platform above. Or they may have only ascended the stairs on each round, and worshipped the large figures facing them. As the ledge of the Sanchi Tope is only 5½ feet wide, if the monks occupied it, there would be no space left for worshippers to walk round, hence I suspect that going up the stair at each performance of the *pradakshina*, as it was called, and returning again to the lower terrace would be the most likely rule. It seems to me that this would be in perfect keeping with what I have myself seen in the Buddhist monasteries of Tibet, where I have often sat sketching while the monks were performing their long and elaborate ceremonies. Judging from what I saw there, my notion is that in the chaitya temples of India the nave was reserved for the monks, while the public passed up and down the aisles, to worship at the chaitya or tope, at the end. The Buddhist ritual took a considerable time to perform, and being complicated, the music coming in as an accompaniment at particular parts of the service, a reserved place had to be found for the officiating monks, where they would not be disturbed by the crowd. In the square base of the Afghanistan topes, as well as the ledge of the Central India monuments, we find the desired arrangement. If this is the correct view of the matter, the narrow ledge of the Sanchi Tope must have caused the monks to sit in a row all round, like the small figures on the lower moulding of the Ishpola Tope,—that arrangement of statues being most probably derived from the customary manner the monks had of placing themselves.

* Beal's Translation, p. 42; and in Hiouen T'sang, Julien's Translation, vol. i. p. 112, allusion is made to "musique extraordinaire," and to the "rares parfums" at a tope.



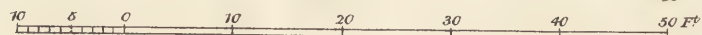
THE NAGARA TOPE.
ON SITE OF
ANCIENT NAGARAHARA,
JELLALABAD VALLEY.



to face page 53

about 60'. 0"

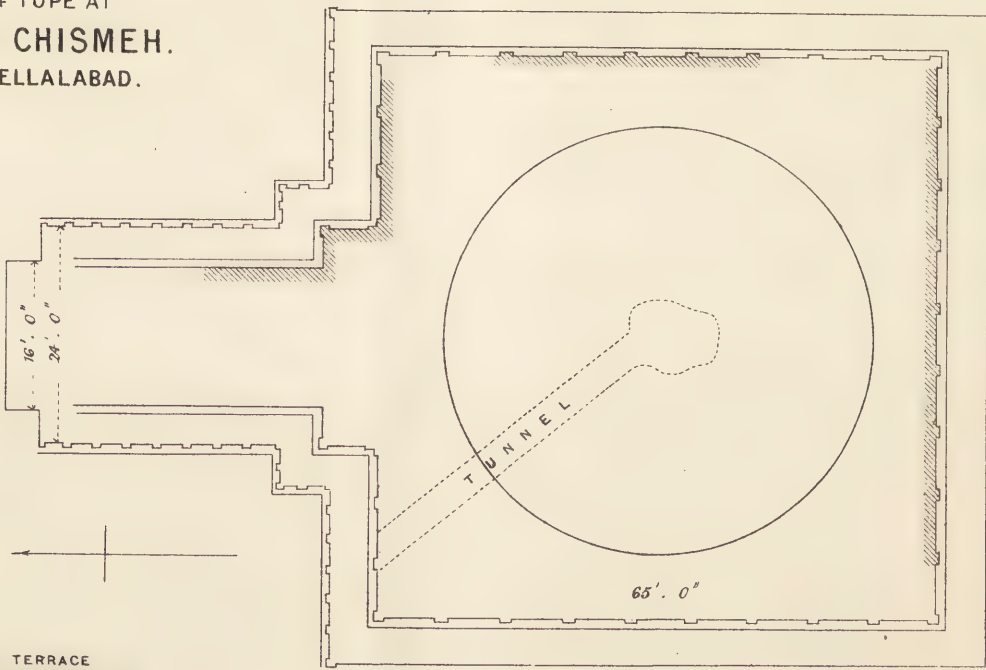
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PLAN OF TOPE AT
GUNDA CHISMEH.
NEAR JELLALABAD.



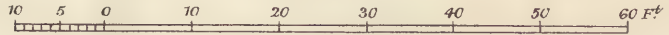
PILASTER



LOWER TERRACE

SECTION OF BASE MOULDINGS
AND LOWER TERRACE

SCALE



William Simpson

Colonel Jenkins, of the Corps of Guides, made an attempt to open the Nagara Goondi Tope, which has been already mentioned, but I regret to say that the advance to Gundamuck stopped the operations. Very little was done, but that little brought to light some very important points in relation to the topes of the Jellalabad valley. While Colonel Jenkins' party were at work on a tunnel to the centre, I asked for a small party to explore the outside in order to obtain whatever details might be remaining of the architecture; this, Major Cavagnari at once arranged for me. The Ahin Posh Tope has been described as a heap of earth and stones; the Nagara Goondi seemed on the contrary to be a cairn of rounded boulders, for the bed of the Kabul river, close at hand, had afforded an easy supply of material. It was a large mound, but on discovering the remains of the square base I was somewhat surprised from the measurements to find that it had been a larger tope than the Ahin Posh. The Ummer Kheyl Tope, of the Darunta group, is perhaps the largest one of which there are remains in the Jellalabad valley. A rough measurement gave 300 feet circumference to the circular part of it, making it 20 feet more in diameter than Ahin Posh. The measurements, obtained from the small part explored, indicated that if the Nagara Goondi is not exactly as large as the Ummer Kheyl, it is very close upon it. The measurements made with a tape line over the mound of stones cannot pretend to accuracy, but I think the square base is 120 feet, and the circular part is close on 100 feet in diameter. I managed only to clear out a portion of one side, and found the plan of the stairs similar to that at Ahin Posh. It has the same pilasters on it, and the mouldings are very much the same. One difference was noticeable: the plastered surface seemed more decayed. I do not mean that it was broken off, but it was more mouldy or weather worn, and suggested a greater age, than the plaster at Ahin Posh, at which place the plaster is in very good condition for a monument which has existed so many centuries. The great interest of the excavations at the Nagara Goondi Tope results from some constructive peculiarities. It is faced with the usual Buddhist masonry, but on the top of the heap are a number of lines radiating from the centre of the Tope; none of them seem to extend exactly to the centre, and they disappear again among the boulders towards the circumference. They are formed of Buddhist masonry, with a face formed only on one side. This is all that could be made out externally. Colonel Jenkins began his tunnel under my advice, on the same level as the one at Ahin Posh, which is just over the base mouldings, and before reaching 20 feet he came upon a wall on the left, which seemed to be on a line direct to the centre. This I had no doubt was the continuation of one of the lines visible on the summit above, and the conclusion is, that these spines or diaphragms were constructed all through the Tope, to give stability to the mass; it is an evidence of great care on the part of the builders. A few feet further on, another wall was found right across the line of the tunnel.* Only a few feet of this wall were brought to view, and it is scarcely possible to say whether it is circular or not, but I think it is so; still, there need be little hesitation in coming to the conclusion that it must be the wall of the circular portion, which had been begun on the level of and carried up inside the square base as a means of strength to the structure above. Neither in the tunnels of the Ahin Posh, nor at Gunda Chismeh, was such a wall met with. If some starting point for the dates of these remains can be found, this peculiarity of construction will no doubt be valuable for working out the results. I had visited the Pheel Khana and the Barabat Topes,

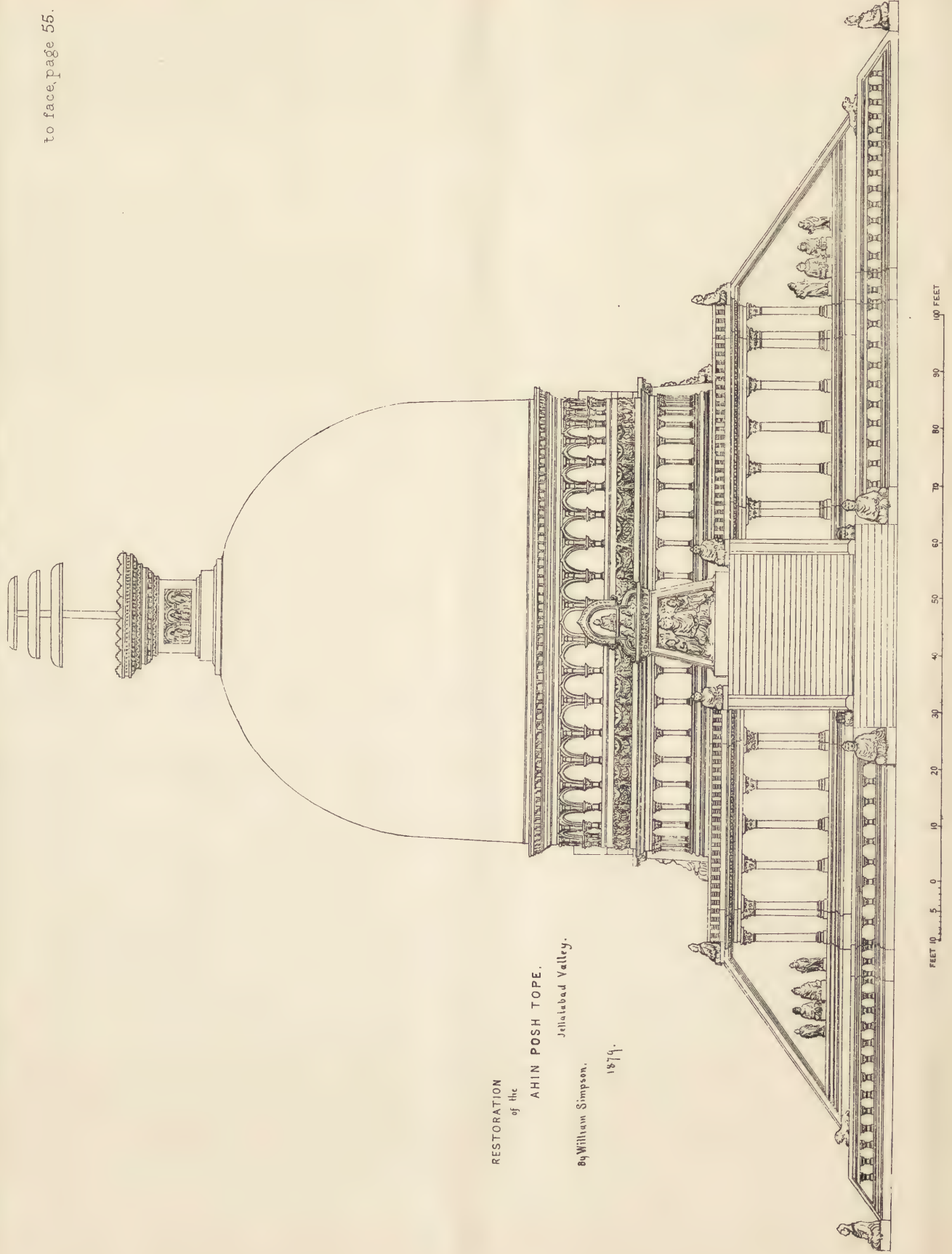
* See plan of the Nagara Tope on pl. IV.

and in looking into the large chasms made by Masson, I noticed walls ; but I hastily assumed they were made by him to support his excavation, and unfortunately did not minutely inspect them. I have no doubt now but they were similar walls to those I have just described. Masson gives plans of inner construction, but so far as I have been able to study them they seem a puzzle.

I have made a sketch restoration of the Ahin Posh Tope, but it should be stated that the effort has been rather to combine the features to be found on more than one tope still remaining in the Jellalabad valley, than to represent the particular one named. I have used the plan of the Ahin Posh, and placed upon it the highest architectural development which the style seems to me to have reached in that region. On all the topes of the Jellalabad valley in which capitals are remaining, I found them to be Corinthian, and they are so introduced into the restoration. Plans of the Ahin Posh Tope, as well as sections of the mouldings, were made by Lieut. Mayne, R.E., and sent to General Cunningham. In the Proceedings of the Asiatic Society of Bengal for last year, a restoration of one of the pilasters appears, which has been made by the General. He makes it Ionic. All the fragments of sculpture, and other remains found during the explorations, were preserved and sent to General Cunningham ; and among them he found a fragment of an Ionic scroll in plaster, upon which he has based his restoration. Here the General has been led into a mistake for which he is not at all responsible. I have a sketch of the fragment, and it was found in our explorations at Hada, so it had no connection with Ahin Posh. Some of the objects found at Hada must have been sent with the others, and hence the cause of his wrong conclusions. The fragment is valuable as showing that Ionic was not unknown, but I can say that none of the topes, large or small, from Ali Musjid to the Siah Koh Range, as far as I saw, have Ionic upon them. This will explain my use of the Corinthian. General Cunningham also adds a hemispherical dome to the elevation of the ruins. In this he makes it something like the Manikyala Tope and the Indian topes ; but it should be stated that this does not give the height of the cylindrical part of the building, which is an important feature of the Afghanistan topes. In none of the topes, except that of Ishpola, do any of the domes exist. Masson gives a number of domes with a pointed arch, but I do not know what authority he had for this, and I doubt its accuracy. The Ishpola Tope is my authority for the round dome. The Barabat and the Khaista Topes give me sufficient examples for the space between the dome and the upper cornice. The Jani and Barabat Topes have only one belt of pilasters, but in the Pheel Khana Khaista and Bimeran Topes, and in those about Kotpoor, the double belt exists, and they illustrate the higher architectural development. In the upper belt in these instances there is in all of them an arch between each pilaster, which will be found in the restoration. So far as my experience goes there was no arch in the lower belt. Above the upper cornice, which is in every case Greek in its details, is a heavier cornice, with a greater projection ; this rests on stone brackets of an ogee form. Between the two belts is a space, but on none of the topes did I find any remains of its details. There is an ornament, a continuous wreath or roll of flowers, which has often been taken for a serpent, for it is represented as undulating like one ; it is on the Amaravati rail, and is found on Buddhist remains as far north as Jellalabad, for I have it on a fragment of stone from Hada, in which little figures support the coils. In a small sculpture of a tope in the Lahore Museum, from the Yuzufzai district,



to face, page 55.



RESTORATION
of the
AHIN POSH TOPE.
Jellalabad Valley.
By William Simpson.
1879.

it appears prominently among the ornamentation, and being a thus favourite feature I have introduced it into this space. At the Ahin Posh the lower course of masonry of the cylindrical portion, which, as I have mentioned, is all that remains, stops short on the north side, and has a projection about 2 feet in length towards the stairs.* This I take to have been the lower part of a projecting base on which rested a large figure. I also saw what I suppose has been a similar projection at the Ummer Kheyl Tope. It is equally reasonable to assume that there would be figures facing each of the four stairs. There were figures within each of the four gateways at the Sanchi Tope. These may have been the four Buddhas or the Devas of the four gates or quarters, described by General Cunningham as having existed at the Bharhut Tope. There is no authority from the Afghanistan remains as to how these figures were placed, so I have fallen back on the Yuzufzai district, the nearest to the locality I am dealing with; and on a sculptured tope from that place, in the Lahore Museum, there is a figure represented sitting in such an arrangement as I have given. The platform of the square base requires a rail, and I have introduced the well-known "Buddhist railing" for this purpose. That it existed in the Jellalabad valley, I am certain, from finding fragments of it at Hada. From the small tope explored at Hada, as well as the topes at Ali Musjid, I have come to the conclusion that the stairs had no railing; there was only a low ledge bevelled at the corners, and that part is so restored. The same small tope at Hada shows that there have been figures at the foot of these ledges, and at Ali Musjid there are lions at the sides of the stairs; these are also introduced. More figures might have been put in, and authority given for them, but there are sufficient to convey an idea of the character of the monument. The lower terrace may have had a railing, but it is not here represented. The sides below this terrace have small pilasters, similar to what was found at Gunda Chismeh. The *tee* on the summit is taken from small models in the Lahore Museum from the Yuzufzai remains; on the authority of a small model of a tope, found by Masson in Afghanistan, a greater number of umbrellas might have been represented as surmounting the whole; but the triple umbrella was the original number in India, and it is here retained.†

The pilaster in the upper belt of these topes requires a little further explanation. It is formed in reality of two parts. The lowest is a very short pilaster, with Corinthian capitals, and over this is a long projecting stone bracket. Above this again is a half-round attached pillar, with the bell-shaped Persepolitan capital, surmounted by a block, which takes the place here of the two horses peculiar to that style. In the small topes at Ali Musjid, Braminic bulls are represented instead of horses; this in itself should leave no doubt that the bell-shaped capital came from the Euphrates valley. The arch form, which figures on this belt, springs from the end of the stone bracket over the Corinthian capital, and is pointed only on its outer moulding. It is found in the Yuzufzai remains, where it appears in many forms, for the most part in a decorative character, as the Greek pediment became. Its identity with the arch of wooden origin, so peculiar to the Buddhist rock-cut temples, need not be doubted.‡ The arch of wooden origin is in this case built of slate, on the arch principal; the slates are partly cut to give the outer moulding, but the exact form was worked out in the plaster. All the mouldings are formed by layers of slate placed with their edges to give the turn of the curves, the whole being afterwards finished with plaster. Where the plaster

* See A in the plan on pl. II.

† See pl. V for this restoration.

‡ See pl. VI., figs. 1 and 2.

was gone I found it almost impossible to sketch the outline of these mouldings, the horizontal lines of the slate made it so confusing. I also give a sketch of a Corinthian capital without its details, it is interesting as showing how they went about their work. The abacus is formed by a slate rudely cut, and pieces of the same material are inserted on which to detail the acanthus leaves with the plaster. These simple fragments are so artistically arranged that one can scarcely fail to see, even in this state, the "core" for a Corinthian capital.*

There is what I may call a strange form which appears in the Yuzufzai sculptures, and also in the Afghanistan remains.† It is often placed along with the arch just described, and seems to be interchangeable with it. I have a theory about this form, but I at the same time confess to having very little evidence to give in support of the idea. This may be described as two sloping jambs with a lintel over them, and I take it to have been originally a door. So little of the walls of the monasteries is left, that the form of such openings as doors or windows is rather uncertain. At Lundi Khana, in one of the ruins on the south side of the Pass, I found a window, the lintel of which was gone, but the sides sloped inwards to the tope; among the walls of the vihara at Ishpola, I found part of a constructed opening—I am not quite sure what it was—the sides of which also sloped inwards. I think that in Tibet sloping jambs of doors are found, and the connection between Afghanistan and that country may justify the supposition that it is a continuation of the same form. My notion is, that this is the pre-Buddhist construction of doors in the region of the Indus valley, Afghanistan, and of the Himalayas, towards the Hindoo Koosh; it was of course a wooden form, and implies a flat roof. I take it to have been, in the locality just named, the counterpart of the round Buddhist arch, of what I may call India proper, and that the round form originally belonged only to the south of the Punjab. I give this suggestion as it has formed itself in my own mind; the materials on which it is founded are of the scantiest, but it may lead others to investigate, and if it could be established, it would throw considerable light towards explaining the first sources of the architecture of Hindostan.

At Hada I found in one of the topes explored by Masson, that one tope had been built so as to inclose another; this process we know took place in Ceylon. Masson's excavation had in the lower part cleared out the first tope, and its form, like a matrix, was left. I made sketches of this, but they all seem too perfect as a representation of the rude mould remaining. The small tope had been about 9 feet in diameter, and so far as I could judge it seems to have been of a different shape from the later topes.‡ The Hada topes are generally rude shapeless masses now, but they are markedly different, I think, from the others in the Jellalabad valley. This particular tope, in which was found the matrix of the other, has some of its external masonry standing, and it is not the usual Buddhist kind. It is built of small squared fragments of a coarse calcareous stone. Masson calls the spot "Gundi Kabul," and the topes here, as well as others at Hada, are, judging by small fragments left, of the same style of building. Being all very much ruined, and no architecture left, no comparison can be made from their styles of architecture. Still the absence of Buddhist masonry is in itself a very marked difference. The ruined condition of the remains contrasts with the fragments of architecture still visible at the Darunta group, and suggests the possibility of a greater antiquity belonging to Hada. The Ahin Posh cannot be older than the second century

* See pl. I., fig. 1.

† See pl. VI., fig. 3.

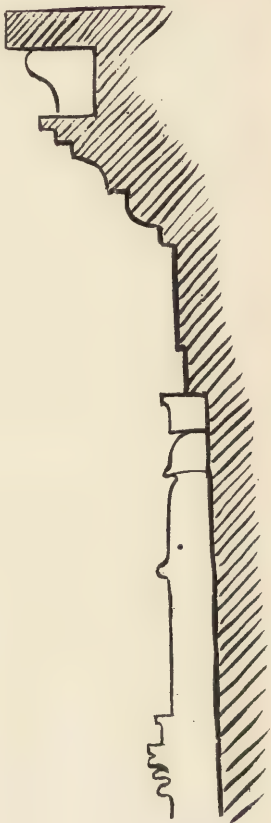
‡ See pl. VII., fig. 1.

FIG. 1



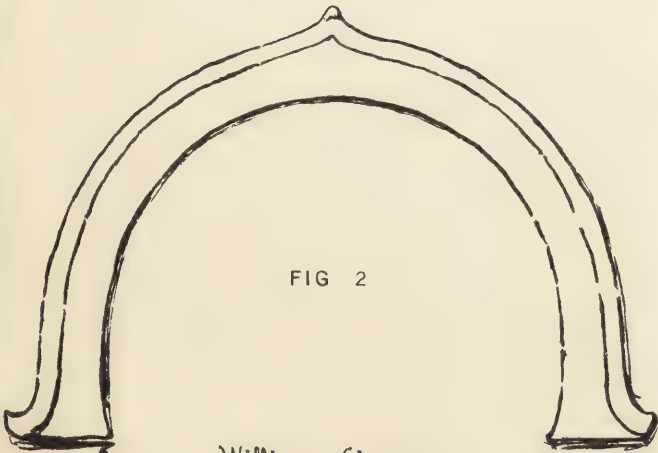
DETAILS OF PHEEL KHANA TOPE.

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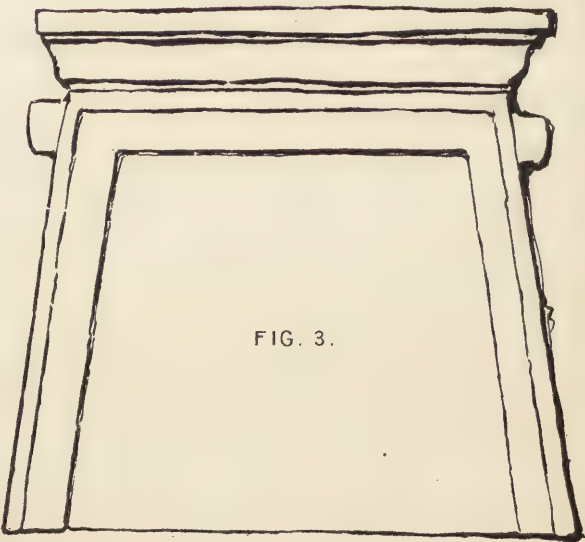
SECTION

FIG. 2



William Simpson

FIG. 3.





of our era, but I am inclined to think it may have been two or three centuries later. The Nagara Goondi is probably older, my impression is that it is much older. A copper coin of Apollodorus, with the tripod of Delphi on it, was found in the piece of the tunnel that was made. This king's date is given as 110 B.C. It would be an important point if it could be established that a Buddhist monument existed as early as this in the Jellalabad valley, and I regret very much that the exploration of this tope was not finished. As it stood on the site of the ancient Nagarahara, it may have been the Stupa of the Tooth mentioned by Hiouen Tshang as being in the interior of the town, and which he describes, even at the time of his visit, as being "antique," and that it was remarkable for "its elevation, its size, and its magnificence."*

The caves of Afghanistan are intimately associated with the Buddhist remains; they are generally found together. As already explained the monasteries stood on elevated ground, and the caves are in the scarped rock beneath. The quantity of these caves is as much a matter of surprise as the quantity of heaps and mounds of what have formerly been structural erections. They are simple recesses excavated in the rock. They vary in size, but if I say 20 feet long, 12 feet high and 10 feet wide, it will convey a rough notion of their average size and proportions.† In some cases two of these are connected by a passage behind, and one cave at Hada has still larger ramifications. One of the most important groups of caves is at Darunta; the front of the perpendicular scarp overhangs the Kabul River, and a long tunnel is cut in the rock behind the caves as a means of communication. The people there call it "the Bazaar." At this place, on the face of the same cliff, is a large niche, perhaps 30 feet high, in which we may presume a colossal figure of Buddha sat looking over the stream and the valley beyond. None of it now remains. Most of the caves at Ajunta, in Western India, are of the vihara kind; they are monasteries, formed of a central hall, with numerous cells all round. In Afghanistan, as far as my observation went, I only found one cave arranged on the vihara plan of Western India; this is one of the Pheel Khana group.‡ All the others are on the separate cell principle. A similar rule prevailed in Ceylon, where vihara caves are not found. According to Hardy, the space allowed in that island for the cell of a Buddhist ascetic was 12 spans long by 7 spans wide. The Afghanistan monks were not quite so limited for space as this statement would imply. The earliest Buddhist caves in India are separate cells, and my guess is that this type must have been carried beyond the Indus by the first propaganda, at an early period before the rock-cut viharas began. The resemblance of the Afghanistan caves to those near Buddha Gaya is not confined to the similarity of type, or to the size alone. The arched roof found in nearly all the Afghanistan caves is a marked point of identity. Where the arch terminates, the wall recedes an inch or two, leaving a drop-ledge—this being another peculiarity of the early Buddhist caves of India. Most of the caves in Afghanistan are in a very decayed condition, but in one or two I came upon, rather better preserved than the others, the sides sloped

* "Qu'il était remarquable par son élévation, sa largeur et sa magnificence," Julien's Translation, vol. i. p. 97.

† See pl. VII, figs. 2 and 3, which gives a plan and section of a cave.

‡ See pl. VII, fig. 4. This sketch plan shows also the Pheel Khana Cave, the two being close together. This last gives now the name to the whole group of caves and topes at this place. The Pheel Khana Cave is unlike all the others in plan and appearance. The entrance is very high, and elephants may have been kept in it, and hence the name, which means "Elephant House." The Rev. S. Beal has suggested that the tope, of which the remains exist on the rocks above, is the "Pilusara," or "White Elephant Tope," mentioned by Hiouen Tshang.

inward towards the top. From some former remarks on sloping door jambs, this may have been done by the people on the right of the Indus after their own models; still, it is a feature to be found in most of the early rock-cut caves south of the Indus. The Lomas Rishi and the Bhaja Caves, may be cited as examples. In most of these Afghanistan caves there is a small recess, which I take, from its size,* to have been for the bed of the ascetic, and this leads to the suggestion that the cave itself was fitted up as a shrine to which devotees would come. The caves were all thickly plastered, and I have no doubt painted, for some fragments were found remaining in a small cave at Hada, and frescoes we know existed in 1842, at Bamian.† There is a nomadic race, called "Koochis," who live with their flocks on the higher lands in the north during summer; they come down to the Jellalabad valley in winter, and use these caves as their dwellings. The result has been the utter ruin of the interiors; every part has been covered by a thick black deposit from the smoke, so that all decorations or inscriptions are lost. At Hada there are a few small caves of a distinct character; these are square, with a dome in the centre of the roof, which is otherwise flat. One of these caves is scarcely over 6 feet square; 11½ feet and 13 feet is the size of two others.‡ It was in the smallest of these caves,—its smallness being such that the Koochis could not use it, and it thus escaped the effects of smoke—that a fragment of painting was found with the colours as perfect as if only recently put on.§ On the small dome of this, as well as on that of others, the remains of painting were visible, nearly all of them Buddhist heads with the circular nimbus. An excavation in one of these square caves brought to light a portion of a base under the dome, with figures in plaster on it. This may have been for a Buddhist figure, or a small tope. If the last be the case, it forms a curious contrast to the splendid chaitya caves of Western India.

In conclusion I may be allowed to express a hope that further explorations will be made in Afghanistan. The existence of a style of art, coming from the valley of the Euphrates, and probably dating from the time of Darius, is now made clear. That the Greek architecture of Bactria came south, and crossed the Indus, is another point also beyond a doubt. Afghanistan is the highway by which these styles came, and it is the country in which to seek for knowledge regarding them. There are vast regions beyond Afghanistan of which we literally know nothing. These localities must be visited. Armies may march and fight in Central Asia, and archæologists must march also, and explore. They at least must conquer. When Afghanistan is archæologically ours, the students of Indian antiquities will be a long way on towards meeting the explorers of Nineveh and Babylon, and I hope that the day is not far distant when they may meet, shake hands, and compare notes, somewhere about Ispahan, Yezd, or Naishapoor.

* See pl. VII., fig. 3., at A.

† Lady Sale mentions them in her *Journal*. See also Masson's *Narrative*, vol. ii. p. 386.

‡ See pl. VII., fig. 5.

§ See pl. VII., fig. 6. The ground colour of the circle in which the figure sits is of an emerald green. It should also be noticed that the person represented sits on a chair, and there is no Guddi, or Pad—as in India. Chairs are still used by the inhabitants of Kaffirstan, showing the possibility of Buddhist, or pre-Buddhist, ideas and customs yet existing in that country.

DISCUSSION.

JAMES FERGUSSON, F.R.S., *Past Vice-President*.—This interesting Paper, with which Mr. Simpson has favoured us, covers such a vast extent of ground, and opens up so many questions, that it is extremely difficult to follow him, and almost impossible to do justice to it, in a discussion, limited as this must be not only by the time of night, but by the means of illustration which are available. When printed, this Paper will be a most valuable contribution to our knowledge of the subject of which it treats. The only information we have hitherto had regarding the topes about Jellalabad was from a Mr. Masson, who opened a considerable number of them in search for coins, in which he was very successful. His results with drawings of the topes were published by the late Professor Wilson in his work called *Ariana Antiqua*, in 1841. But Mr. Masson was not an artist, still less an architect, and his drawings gave little or no information regarding the form, still less regarding the style in which these buildings were erected. Mr. Simpson, on the contrary, is both the one and the other. He has a wonderfully correct eye for details, and a marvellously facile pencil for delineating them, and his plans are really the first we have ever possessed, while his restorations are done with a judgment and knowledge of which we have hitherto had no experience, as applied to the subject. Besides these advantages he has brought home photographs made on the spot, and others from the vast collection of antiquities from the Peshawur valley, which fill the Lahore Museum to overflowing. And in addition to all this he has brought home specimens of the antiquities themselves, which are now on the table before us. Besides all these advantages, Mr. Simpson has considerable previous experience in India and Tibet of the form of Buddhist architecture, and consequently approached the investigation of these ruins with advantages possessed by few among those who have hitherto made the attempt. Perhaps the most striking and important fact brought to light by Mr. Simpson's drawings, when combined with the recent discoveries in the Peshawur valley, is the singularly classical character both of the architecture and of the sculpture of the valley of the Kabul river. Nine-tenths of the capitals of the pillars and pilasters are Corinthian, and the bases and mouldings generally are such as are most unmistakeably derived from the far west. It is true that with these there are found a certain number of bell-shaped capitals surmounted by double animals which look like a reminiscence of the pillars of Persepolis, and these, as Mr. Simpson remarks, are found in the caves at Karli and elsewhere in India. The similarity is however so remote that it is hardly sufficient to sustain Mr. Simpson's assertion that every form of art was imported into India and nothing ever came out of it. This quasi-Persepolitan art in India is evidently derived from some wooden prototype, and may have been practised simultaneously in the two countries, without its being clear that the one borrowed its forms from the other. But be this as it may, it is quite certain that the classical style, with which it is mixed, never penetrated—except sporadically—beyond the Indus. It was there met by a style with which we are perfectly familiar in the third century before Christ, and from that time onwards. It is perfectly Indian and original, and if it never was carried westward out of India, it certainly never was imported. It was invented and perfected in India and spread

eastward through the whole Indo-Chinese countries, though Mr. Simpson is quite correct in saying it never spread from India westward. The most interesting and most important point raised by the Paper is in reality the inquiry whence this classical art came into the valley of the Kabul river, and when it first appeared there. The first and most obvious suggestion is that it was left there by the Greeks, who established the kingdom of Bactria immediately after the glorious raid of Alexander, and who no doubt left buildings and statues in the country they held for a century and a half. No remains of this art have however been yet found in the valley. Everything that has been discovered is clearly and essentially Buddhist, and Buddhism it is generally admitted was introduced into the country by Kanishka, a king who reigned at the end of the first century after Christ. An interval therefore of between two and three centuries must have elapsed between the fall of the Bactrian kingdom and the earliest building we know; and it is difficult to understand a school of art retaining its traditions in a foreign country for such a lengthened period. It is a curious confirmation of this, that, as mentioned by Wilson in his *Ariana Antiqua*, not one coin of a Bactrian king has been found among the hundreds that have been discovered in the topes, while Mr. Simpson himself found coins of Trajan, Domitian and Hadrian; and Mr. Masson others of the Emperor Theodosius (408 A.D.) and Martian and Leo (474 A.D.) in topes erected subsequently to these dates, but all of which in so far as their architecture can be made out are of the same type. In addition to this it may be mentioned that the Corinthian order, found in the valley of the Kabul river, is not the Grecian order, or at all like it. It is not even the Roman order as practised in the third century at Palmyra—the nearest point. We know exactly what was done there in the times of Zenobia and Aurelian, and it was very like the order found in the Portico of the Pantheon at Rome in the time of Augustus. The order here is essentially Byzantine, such as we find in churches at Salonica and in Asia Minor after the time of Constantine, and it is coupled with a form of Buddhism that in India did not exist before the third or fourth century. In India proper there is no statue of Buddha in any of his conventional attitudes which can possibly be dated before 100 A.D. In these Jellalabad topes figures of him in every mode and attitude occur by dozens, it may be said by hundreds; such a multiplication of images is not found in India before the fourth or fifth century. It may have been introduced earlier into the valley of the Kabul river, but how much earlier must be left for future investigation. Meanwhile, however, I am very much of the opinion, just expressed by Mr. Simpson, that though from the existence, in its cella, of Roman coins of Hadrian, the Ahin Posh Tope which he opened cannot be earlier than the second century A.D., he is inclined to think it may have been two or three centuries later. If this is so it follows almost inevitably that the bulk of the Buddhist ruins in the valley of the Kabul river is more modern than has generally been assumed, and may date from the second or third to the sixth and seventh centuries of our era. It is of course very difficult to understand, in the present state of our knowledge, how any Roman or Byzantine influence can have extended to this remote province, across and beyond the Parthian and Sassanian kingdoms, after the time of Valerian—say 260 A.D.—but this is just one of those questions where the testimony of art, and especially of architecture, becomes so valuable, and renders such a subject as that brought before you this evening by Mr. Simpson so especially interesting. The fact is certain that there exists, in the valley of the Kabul river, a number of buildings ornamented with pillars

and pilasters of the Corinthian order which does not, and never did, extend into India; and also that that order resembles far more one used in the Byzantine empire in the fourth and fifth centuries than anything found before. It is equally certain that it is combined with a school of sculpture so similar to one of the same age that if specimens of it were placed in the Vatican or Lateran Museums, and labelled as belonging to the Byzantine school of the fifth century, few would detect the difference. There is indeed one specimen on the table, which, if photographed to a small scale, and handed round with an ivory of Valentinian, few would be able to detect from either the architecture or the art that they were not manufactured at the same time and place. The costume of Buddha would betray the difference, but not the style of execution. I wish I could venture to hope that this Paper will induce others to turn their attention to a subject which is full of interest, but at the same time, it must be confessed, full of difficulty. It will require the earnest attention of many earnest searchers after truth, before a solution, which will be satisfactory to all, will be obtained of the many problems involved in it. At the same time it is to be feared that the materials hardly exist in this country, to enable the question to be studied with the fullness it requires. Six months ago the Indian Museum possessed a collection that went far towards supplying that want, and further materials might easily have been obtained from India at very little trouble or expense. Since then that Collection has been broken up and dispersed, and at present no means exist in this country sufficient to enable these questions to be scientifically examined. Meanwhile, however, coins and photographs are available, and these, with such details as Mr. Simpson has brought before us this evening, and it may be hoped others will supplement, will go far towards enabling scholars to appreciate the importance and to understand the bearing of the many questions involved in the study of antiquities from the valley of the Kabul river in Afghanistan and Peshawur.

COL. YULE, C.B.—As Mr. Fergusson has said, in following a Paper like this, so full of matter and touching so many points, it is possible only to catch hold of one or two points, without being able to enter into any systematic discussion of the whole subject. What Mr. Fergusson has just said as to the resemblance of the sculptures on the table to Byzantine work, and especially to Byzantine ivories, is very striking, and entirely new to me. I should have been disposed to adhere to the old view—if we can call anything an old view in regard to a subject which is so recent—that these traces of Greek art were connected with the existence of a Greek monarchy in that region, that is in the valley of the Kabul river and the provinces immediately adjoining it. For, if we look at the coinage which has revealed the greater part of what we know of the ancient history of that region until now, when we are beginning to derive materials also from remains of architecture, we find, first, coins of pure Greek art, or tolerably pure Greek art, struck by kings who actually were Greeks. Next, when the Greek monarchy in that region had been overthrown by barbarians from Central Asia, we find that they inherited or picked up a certain amount of the art of the Greeks, whom they had overthrown, and imitated their coins. But their coinage gradually became barbarised, and the Greek letters gradually became corrupted, until they are scarcely legible as such, and vanish at last entirely into barbarism. Thus, also, I should have thought it probable that architecture, derived from the same source and the same period, might have run an analogous course, which would account for the fact that we trace first the Corinthian decoration and the

sculpture gradually becoming corrupted, but both still retaining a certain flavour of Greek, until finally that flavour vanishes into barbarism, or at least into the barbaresque, and into what has become essentially a Hindoo style of art. I only mention this as the view I had before I heard what Mr. Fergusson said. Most things that he says, are striking and suggestive, and one at least hesitates to oppose them.* I do not know whether the audience clearly understand where this locality is. Jellalabad and the other places mentioned are in the valley of the Kabul river which comes running down from the west to the east, entering the Indus, which was approximately our frontier before the war; and it was in accompanying the first expedition, the year before last, that Mr. Simpson performed the most meritorious service in examining these antiquities. Now this valley of the Kabul river was, as I said, one of the chief seats of that Greek monarchy, and after that it was the seat of various semi-barbarian monarchies, but as far as we can understand about the population and their character, they were essentially Indian—the country in fact was Indian. Though now it is not Indian, nor any part of India, yet up to probably the eighth or ninth century that country was a part of India, inhabited by Indian people, with Indian customs and the Indian religion. At that time it was, as these remains show, a valley rife with population, art and civilization. But it afterwards became a highway of Mahomedan conquest, and then at a late date, for about a century, the scene of almost annual inroads of the Mongols and Tartars, till at last the country became desolate. We have two striking pictures of it with a long interval between. There is one given us by that Chinese pilgrim, Hiouen Thsang, whom Mr. Simpson so often quoted, who travelled from China to India for devout purposes in the early part of the seventh century, travelling through Central Asia and Bactria, and entering India by the Kabul valley. He describes the splendid edifices which then existed in the valley of Peshawur. He describes a tope 700 feet high! This may or may not have been a true measurement, but without doubt the tope was very high and imposing; it was covered with gold, and crowned with those splendid umbrellas and gilded bells hanging from them. Another Chinese traveller describes enthusiastically the bells of the tope—those golden bells—as “tinkling in the morning wind.”† There were probably many of these buildings around Peshawur, which is now our great frontier post in that quarter. At present, as Mr. Simpson has said, there is nothing like architecture in the country. All this civilization was swept away. For a long time the land lay desolate,

* One of Mr. Fergusson's grounds for doubting the view contained in the preceding sentences is that we have no architectural remains of this character dating earlier than the first century A.D., or say two centuries after the downfall of the Græco-Bactrian monarchy, whilst most of them are probably two to four centuries later in origin. But I cannot conceive that Greek princes, who issued such coins as we know, would have built no temples or palaces of parallel Greek character. So that, whether we find their remains or not (and how much has yet to be explored!) these buildings must surely have existed. May not the development of a style so like Byzantine art in some respects have been an independent result of analogous causes acting on the same original models? Mr. E. Brandreth lately showed at the Asiatic Society the extraordinary analogies which exist between the forms in which Sanskrit has broken up into the various Prakrit languages of modern India, and the way that Latin broke up into the various Romance languages of modern Europe. These analogies are not only minute in some respects, as between one Prakrit and one Romance language, but even we find one Prakrit shaping its deviations from Sanskrit in exact analogy to Italian deviations from Latin, whilst another is in as exact analogy to French. These analogies are more wonderful than the resemblance which Mr. Fergusson points out between Buddhist and Byzantine sculptures. Yet no question of imitation is here possible.—H. Y.

† “At sunrise the gilded disks of the vane are lit up with dazzling glory, whilst the gentle breeze of morning causes the precious bells to tinkle with a pleasing sound.”—Beal's *Buddhist Pilgrims*, p. 204.

insomuch that the great Sultan Baber, the Moghul conqueror of India in the sixteenth century, describes how he went to hunt the rhinoceros in this same Peshawur valley, a place which then had become the haunt of that animal—an animal which is not now found within a thousand miles of Peshawur. Then came in gradually the Afghans from the south and south-west, and occupied the land,—a people without the rudiments of art, without anything even like decent brickwork or carpentry. That is one of the things about which it occurred to me to say something. I cannot attempt to make my remarks connected, but I will take up another point. Mr. Simpson often mentioned the word “vihāra,” and that he didn’t explain it, was, I think, hardly fair. The word means a monastery, the dwelling of the ecclesiastics, which was generally attached to, or in connection with, those topes, these latter being in fact not only places, but objects of worship. That word “vihāra” affords an instance of the extraordinary spread and influence of Indian religion. You have all heard of Lord Clive’s original acquisition for the East India Company of the three Provinces of “Bengal, Behar and Orissa.” Now Behar Province takes its name from a town called by the same name, which derived its existence and its title from a great Buddhist vihara which once stood there. Again, we had last year in England as a visitor the young Maharajah of Kooch Behar. Well, his territory also takes its name from another great Buddhist monastery which existed in it probably 1200 years ago. You may have heard of the great alarm last year of the people in Bombay lest the great dam of the water works which supply the city with water should burst. That dam is called the Vehār Dam, and the name of this again is derived from the fact that it stands near the ancient site of another great vihara or monastery. If, once more, we go further up the valley of Kabul, cross the mountains and cross the Oxus, we get to the city of Bokhara. That city again, we learn from old Arab writers, was called so, because in Pagan times it was the seat of a college, or company of learned men, that is to say, it was a vihara. That also must have been a Buddhist monastery. Now this gives you some idea of the former enormous influence and spread of the Buddhist religion from India, upon the face of which vast country no Buddhist now exists. There is no real Buddhist now existing in continental India—not at least in our territory,—and yet this religion not only has left its gigantic footsteps over India itself, but once spread from India over all the adjoining countries and islands, in several of which it still survives. Once more, I was much struck with what Mr. Simpson said of the persistence, in the region of which he speaks, of tomb-worship, in spite of all the change of external forms. The ancient inhabitants of the Jellalabad valley worshipped at their tope, which was in effect the shrine of a dead saint. And now the Mahomedans again erect their little ziārat, probably upon the same hill, and worship there at the shrine of *their* dead saints. I may conclude by mentioning that this sort of saint-worship is very prevalent among the very wildest and most ruthless robbers of those Afghan valleys. Indeed it is said to be especially dangerous for a holy man to travel among them, because they are pretty sure to knock him on the head, in order that they may have a shrine handy to worship at.

THE PRESIDENT.—I will only say in the name of the Institute how grateful we are for a Paper of this importance and novelty. I think it is particularly appropriate that it should have been read within these walls. A thought has been suggested to me with regard to the architectural character of these remains; I think that it will probably occur to many that the character of the remains indicates that the style has not come directly from the Greek, but

that it is Roman rather than Greek in its derivation. I hasten to propose a vote of thanks to Mr. Simpson for the excellent Paper he has read.

The vote of thanks, put from the Chair, was carried by acclamation.

WILLIAM SIMPSON, F.R.G.S.—I acknowledge, most heartily, your kindness in the manner of passing this vote of thanks, and independently of the value of your approbation I wish to add how pleased I am to have read this Paper to-night before you. The geography referred to in my Paper deals simply with the banks of the Indus; it is only necessary to keep in view the two sides of that river, and the valley of Jellalabad, with which you are all no doubt familiar now as part of our new frontier. Regarding one of the styles I have spoken of, whether it came first from the Greek influence at an early, or a later period, that is, I am afraid, an uncertain matter upon which, in our present state of knowledge, to give an opinion. The connection may have continued between Bactria and the west from the Greek period down to the later Roman and Byzantine dates; that is not impossible. There is undoubtedly a great resemblance between the sculptures exhibited here to-night, as Mr. Fergusson has pointed out, and the art of the time he mentions. There is quite sufficient evidence, however, to show that the Greek influence came into Afghanistan; probably it did not come down in that direction for some time, during which it remained in Bactria, and only moved towards the Indus when splendid buildings were required. The time it took the Greek to become Roman, and then the Roman to change on the one side to Saracenic and on the other to mediæval, was quite as long a period as that we are dealing with in the more eastern part of the world—at least I think the time in each case is about the same, and that they may be compared. There may be remains yet existing about Bactria which would throw light on these subjects, and when I went out it was one of the objects I had in view to get up in that direction. I had a great desire to visit a spot a hundred miles further north than Kabul, that is Bamian, but I found it was impossible, and came back rather a disappointed man in consequence. The events which afterwards took place at the Residency in Kabul have modified my feelings in regard to this.



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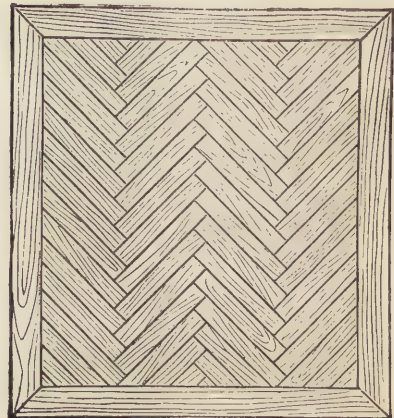
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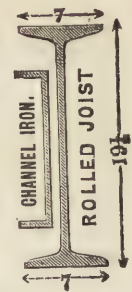
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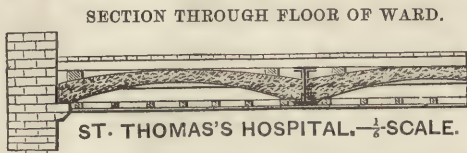
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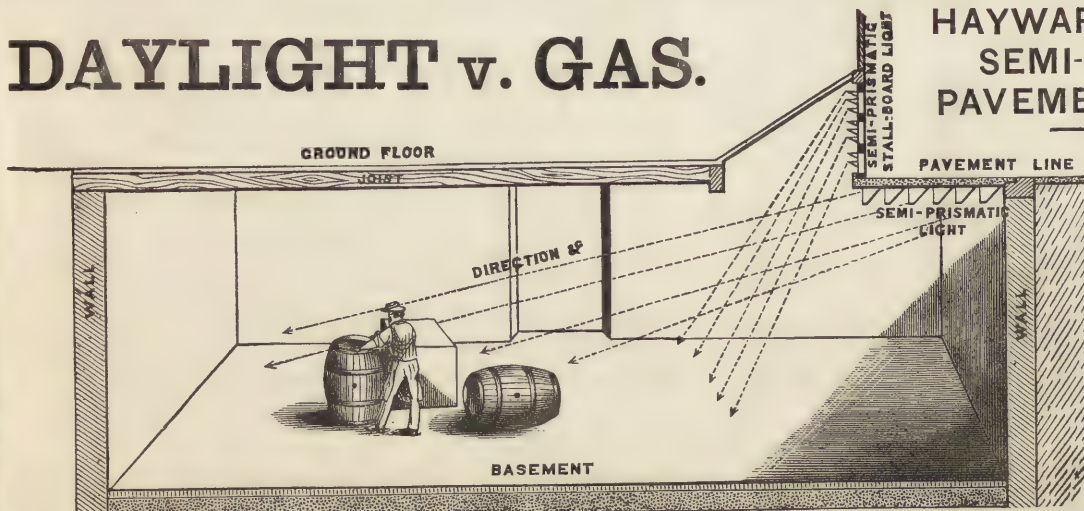
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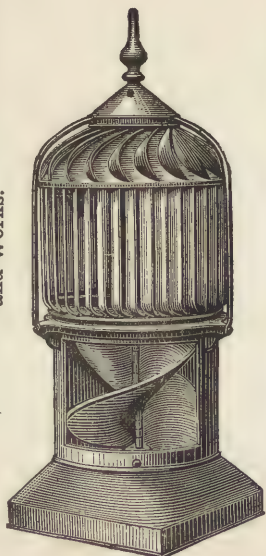
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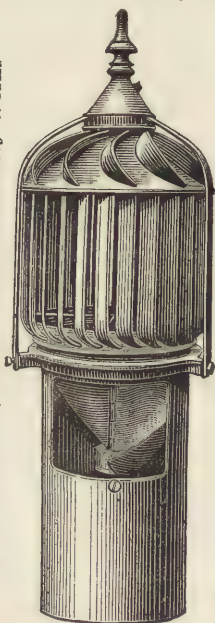
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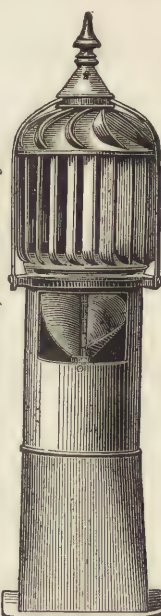
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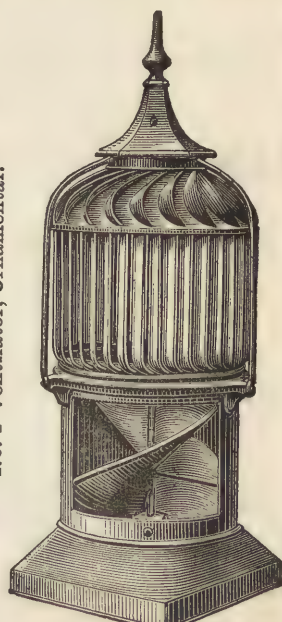
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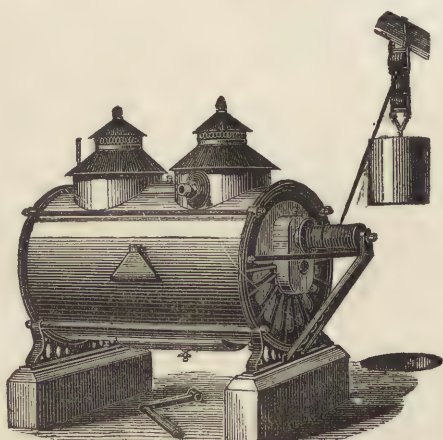
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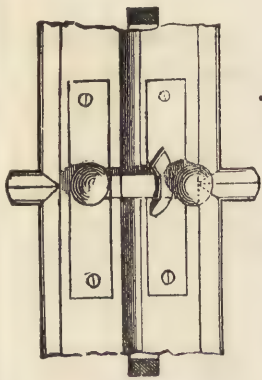
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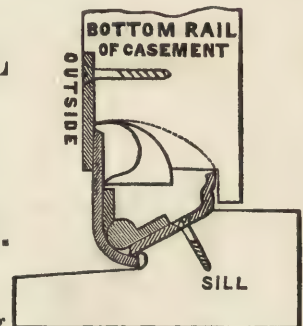
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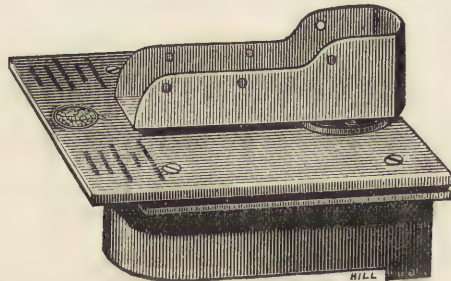
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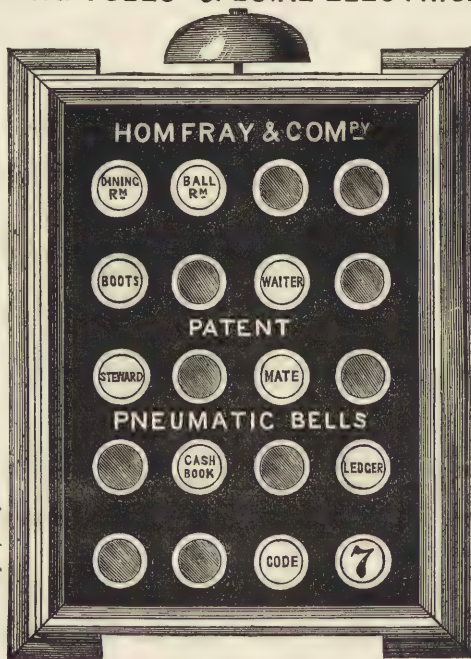
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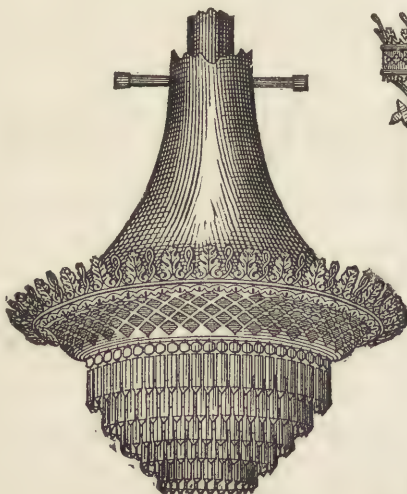
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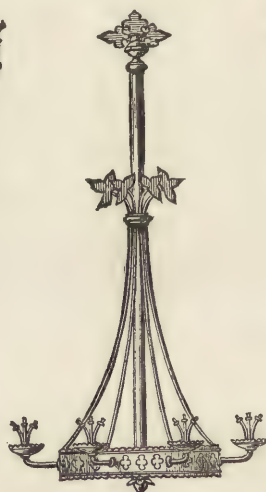
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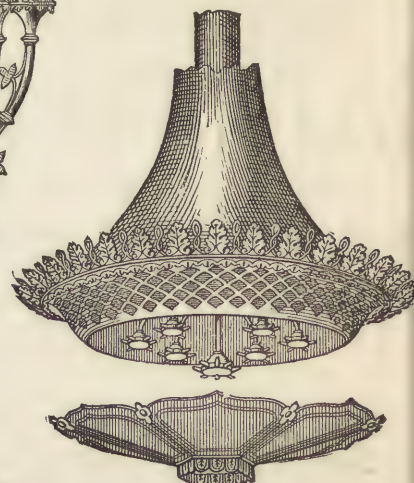
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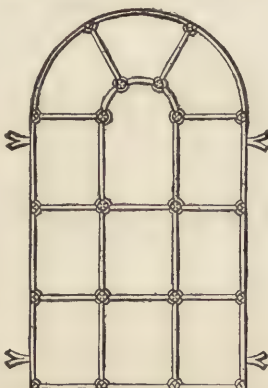
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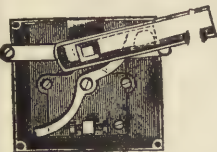


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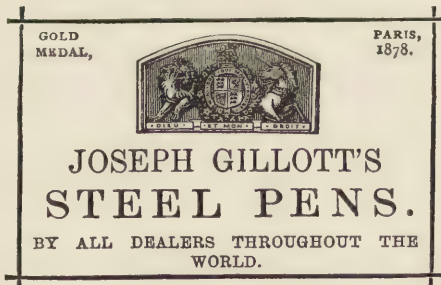


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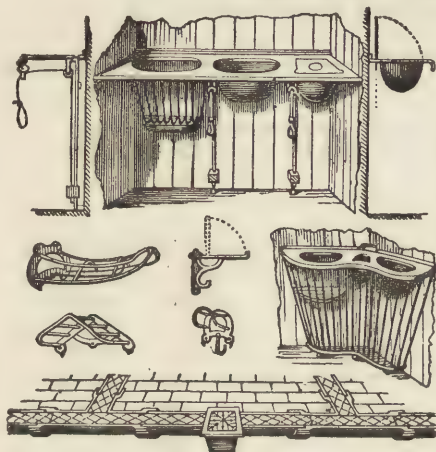
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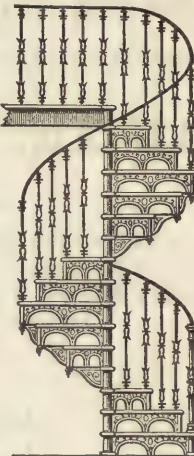
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IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.

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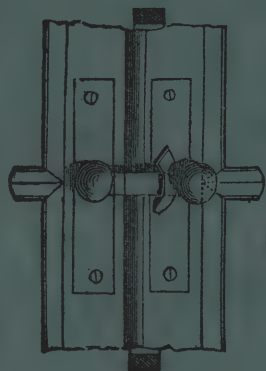
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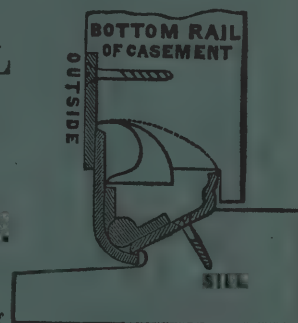


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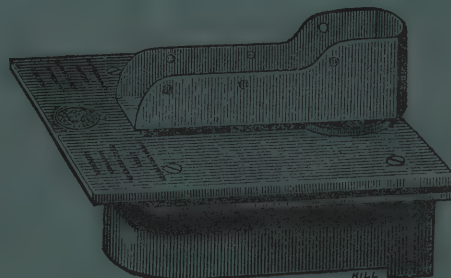
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IV. ARCHITECTURAL COMPETITIONS. By THOMAS PORTER, *Fellow*.

MR. PRESIDENT AND GENTLEMEN,—I should not have been justified in appearing before you this evening, were I a stranger to the labour involved in preparing a set of competition drawings; but having on my own account, or responsibly for other architects, taken part in all the largest national competitions (except the Law Courts) and frequently on premiated designs, I may at least claim to have some experience of the subject.

In November last, I had the honour of addressing a circular letter to the Members of the Institute which has been kindly acknowledged by a large number, and commented upon in the professional papers; but as there may be some present who are not acquainted with its contents, I will, with your permission, commence by reading the letter in full, as follows:—

2, Westminster Chambers, Victoria Street, S.W.

DEAR SIR,—As the season is approaching when the Institute will again meet for its Sessional deliberations, I intend at an opportune moment (if I can rely upon the support of the Fellows generally) to call the attention of the Council to the subject of "Competitions," with a view to some practical steps being taken to minimize the evils arising from the Competition system as at present practised.

Believing that the Institute is the only body that can with any hope of success deal with this subject, I venture to hope that the time may have arrived when the Fellows (about 350 in number), as the elders of the Institute, will by some dignified act take the initiative, and determine from some given date to refrain from engaging in any open Competition (or in any limited Competition where a substantial honorarium is not offered to each competitor), and will make it incumbent on every Fellow hereafter elected to sign a declaration that he will not engage in any open competition.

It is not too much to hope that such a course of action would ultimately lead to the discontinuance altogether of the Competition system, as Committees would hesitate before advertizing for designs, if they felt sure that not a single Fellow of the Institute would respond to such an appeal, and it is not unlikely that a large proportion of the Associates and the Members of other Architectural Societies would cheerfully follow the example set by the Fellows.

One of the arguments (and it is a powerful one) at present used by those who engage in Competitions, to justify their action, is that the Fellows of the Institute have not hitherto discouraged the system, but rather that, on the contrary, some of the most distinguished men are still found ready to engage in any Competition of importance.

Open Competition *must* be a serious loss to the Profession as a body, as it may be taken for granted that few buildings of any importance are now erected without some Architect being professionally employed, and consequently the whole expense of Competition drawings, and the time expended upon them, is so much money absolutely thrown away, less the premiums (which are generally small) that may be paid to the successful Competitors; and while it is difficult to estimate with any degree of accuracy the cost of Competition drawings, it can be no exaggeration to say that very serious sums must have been lost in the several large Competitions that have recently engaged the attention of the Profession.

Small Competitions are even more prejudicial to the well-being of the Profession, because the number of Competitors is often very numerous and the premiums small, and not unfrequently the payment of the premiums is the end of the matter. I may, as an instance of this, mention the Addiscombe Road Church Competition, when 75 competitors responded to the invitation, and the work was never carried out, the premium of 50 guineas being the only remuneration paid.

Assuming the modest sum of £10 as the average cost of each set of designs (and it would probably be three times that amount in many cases), the loss to the profession on this Competition alone amounted to £700, and

such instances are not uncommon, especially in Church Competitions. It is clear, therefore, that the amount annually lost by the Profession through the Competition system must be very large.

The total abolition of Competitions would I believe do at least three things for the Profession :—1st, increase its dignity ; 2nd, materially improve the financial resources of its members ; 3rd, materially benefit the position and increase the remuneration of the Architectural Assistants in our offices.

I may at some future time place before you some important statistics relating to Competitions ; and in the meantime I shall be greatly obliged if you will favour me with any suggestions that may occur to you on the subject to which I have directed your notice, and especially inform me whether, in Competitions where you have been successful in gaining the first premium, the works have been carried into execution with results wholly satisfactory to you, or whether the reverse has been the case.

I should also be glad to know that you sympathize with and would support a movement of the Fellows in the direction I have indicated, that I may regulate my further action accordingly.

Whether the system of open and unlimited competition has worked, and is still likely to work beneficially, or whether it should be entirely discouraged will probably be for many years an open and vexed question with our profession.

It is urged by those in favour of competition that, if the system were abandoned, little opportunity would be given for men of obscure position (but with undoubted talent), not having the advantages of professional or family interest, to rise from such obscurity into notice, and that the prizes of the profession would be monopolized by a few well-known leading men—many, no doubt, distinguished by their architectural and artistic attainments, but some known rather from their good business habits, social qualities, and other advantages that birth or fortune had secured to them. Also that, in our large public buildings, advantages arise out of open competition by drawing forth many and varied modes of treatment, of which such buildings may be capable ; and in the probability, or at least possibility, that some obscure genius may arise and produce so vigorous and original a conception as to stamp his ideas at once as the work of true genius, and leave no doubt as to his title to be selected as the architect to carry the work into execution.

Again it is frequently thought that competition affords an opportunity to a young man to exercise his ingenuity and skill on a definite practical object, and that having the whole responsibility on his shoulders of preparing a design, it puts him on his mettle, and has a beneficial influence in rendering him in early life entirely dependent on his own resources in thinking out his plan.

Much weight might some years ago be attached to such views of competition, and some men of mark have undoubtedly arisen from obscurity through the channel that unlimited competition afforded them ; but it hardly follows that what may have worked beneficially for a few individuals in one age is necessarily applicable to every period, and the circumstances surrounding the architectural education and practice of the present generation are so obviously different to that which immediately preceded it, that it would be somewhat difficult for any man of real genius at the present time to remain long in the region of the altogether unknown and unappreciated.

The Institute of British Architects and the kindred Societies have done much to help the younger members of our profession who may be wholly dependent for advancement on their artistic skill and professional attainments, and nothing can be more calculated to stimulate them to energy than the conviction that their efforts will be appreciated, and that they will receive every encouragement if they succeed in proving they possess abilities that distinguish

them amongst their own professional brethren; and once recognized by their colleagues it cannot be long before their names become familiar to the general public and they reap the financial results their talents so justly deserve and command. The influence of architectural societies on the members of the profession is clearly shown by the large number who possess high artistic attainments, though there may be fewer than in former years who rise to the very highest pinnacle of fame, and indeed the spread of educational facilities renders it more and more difficult to reach the very highest position. It would serve no practical purpose to trace back the exact date at which the system of architectural competition was commenced, or to whom may be attributed the notoriety of having inaugurated the opening-up a wider field of choice of design than could be secured by application to one selected architect. At the early part of the present century architectural study was in so lethargic and dead a condition that it may have naturally occurred to more than one individual that by the adoption of the competition system some latent talent might be developed and the abilities of untried and obscure men be made known who would infuse new spirit into the art. Even at that dead period a few eminent practical men existed, possessed of great learning and scientific knowledge, and whose memories will ever be held in veneration and respect; a large majority, however, were content to work out the details of their designs much according to the rule of thumb, copying, as they thought, the correct proportions of their buildings from old sources, but failing to catch any of the vigour of the style in which they were working—when a few men of real genius were brought to light through the competition system. These, catching the true spirit of real architecture, threw such fire and originality into their work as to produce buildings of which even the ancients might have been proud, and handed down to posterity edifices that will ever be an ornament to this country. The success of a few men gave a tremendous impetus to the competition system, enabling it to gather force from year to year until it has now obtained such a hold and fascination upon the profession, and the evils surrounding it have become so numerous and patent, as to threaten at some future time considerable damage to private practice, unless something is done to check the mania for small and insignificant competitions. Although it is open to grave doubt whether the system of competition, even for a large building, is the best means of obtaining a perfect design, few perhaps would be inclined to take very violent exception to an honourably and fairly conducted open competition (if such a thing were possible) for a very costly and magnificent building, involving the outlay of many thousands of pounds; but even the most ardent admirer of the system, I venture to believe, would never justify its being extended to what is now so common, viz., the advertizing for designs for buildings of every conceivable sort and size, often combined with instructions of the most vague description, and sometimes in terms even insulting in character. Indeed, though I shall refer to the larger competitions, it is specially to the evils of the smaller ones that I desire to draw attention, with a view to their discouragement, and to some means being adopted for placing both large and small on a more satisfactory basis. I have reason to believe, from the numerous letters I have received from members of the Institute, that there are a large number who think competitions of all kinds, and especially open competitions, objectionable; that they tend to lower the status of the profession and are prejudicial to the interests of art. The esteemed editor of the *Builder* has for years perseveringly pointed out the serious evils of the competition system as hitherto conducted, and its degrading influence; and those who desire to inform themselves on this point may with

profit refer to the many interesting articles written from time to time, the latest being on the 8th of November, 1879, from which I quote as follows :—

“The aim of Mr. Porter’s circular seems to be in part to create an *esprit de corps* on this matter on the part of at least the leading members of the profession, most of whom are Fellows of the Institute—and perhaps all will be shortly, for we have recently observed that some of those who for some time stood aloof from the representative body of architects have thought better of the matter and enrolled themselves. He wishes to induce all the Fellows to agree formally that they will enter into no competitions in which the competitors are not to be remunerated for the time and labour expended on the drawings. This of course means that they will enter into no open competitions. Whether or not it will be possible to induce all the body of Fellows to agree on such a determination we do not undertake to say ; all we commit ourselves to on that head at present is, that if a large majority of the Fellows are willing to do so, or to bind themselves to any reasonable course in order to limit the waste of labour in competitions, it appears to us that it would be an absolute moral duty on the part of the small minority to sink their differences and join in the general movement. The want of cohesion and joint action in the profession is a great source of weakness and loss of dignity, and is a constant subject of comment of no agreeable kind on the part of outsiders. No body of professional men can expect to be fully respected who show no capacity for combined movement or for postponing the occasional advantage of individuals to the general good. Granting that such an agreement could be come to, what would be its effect on the competition system ? That depends a good deal on how far the younger and less distinguished members of the profession will follow the lead of the Institute Fellows. If they do so to any large extent it will follow, as Mr. Porter implies, that architectural competition will be pretty well knocked on the head. If they do not, the result will be this : that people who wish to have a competition will know that they cannot obtain the services of the leading architects without paying for them all, and they must in that case select a limited number, and this would probably be the course followed in regard to some of the larger buildings for which open competitions are now advertized. Those who do not care to pay for competition may count on the chance of unearthing a new genius among the younger and unknown men who have not cared to limit themselves by any condition of this sort. If there were a probability that this latter result would often follow, it would not, we must admit, be a very consoling thing for the leading men, who had upheld the dignity of the profession by refusing to compete, to see the work taken from them by an unknown man who had thus found the opportunity to make himself known. This has happened at times ; we must say, however, that we regard it as an exceptional chance. It is very seldom indeed that a large competition, when conducted by competent judges, is gained by anyone who had been entirely unknown previously. We do not see therefore that this consideration need deter Fellows of the Institute from the very great advantage in regard to dignity in the eyes of the public, and the aggregate remuneration of the profession generally, which they would go far to secure by adopting such a course as that suggested in the circular referred to. But it must not on the other hand be forgotten that to close architectural competition entirely would remove one chance of gaining distinction from rising men who have their names to make.”

The *Building News*, writing on the same subject, says :—

“Theoretically we must fairly admit all the evils ascribed to the competition system Mr. Porter mentions. In the first place, it must be allowed that the profession is not what it used to be before that system was introduced, and that the art has sunk in reputation ever since. Architecture is now far more than it was a commercial industry, and competition has done much to place the product of the architect’s skill on a level with other commodities. The consequences have been fruitful of mischief. The art has been brought to the level of a manufacture ; architectural design has passed virtually into the hands of a few experts whose only object is to turn out drawings of exteriors without the slightest regard to structural or architectural principles ; feats of draughtsmen are mistaken for architecture, while the standard of professional morality has been considerably lowered by the practice of competing architects sending in designs far in excess of the real cost. But there is another aspect of the question, and one which concerns the younger and less fortunate members of the profession. It may be urged with justice against Mr. Porter’s proposal, How are the less fortunate of the profession to obtain the position and the emoluments of the more successful if open competition be done away with ? Here we have unquestionably the greatest difficulty to solve.”

If this criticism of competition be correct, and the result of the competition system be to lower art, so that showy exteriors are made regardless of architectural and structural principle, we have at a very serious sacrifice purchased the few examples of fine buildings that

have come to us through the medium of competition; and taking into consideration also the enormous amount of time and money that has been expended,—the heart-burning and disappointment that have resulted to nine-tenths of those who have engaged in competition work,—there is scarcely a building in this country, however grand and beautiful it may be, justifying the sacrifices made in the general welfare to possess it.

Allow me now to read a few letters from Fellows, some of whom feel very strongly on the subject of competitions.

A provincial architect writes :—

“For many years (more than twenty) I have steadfastly set my face against open competitions, in fact have positively refused to engage in one—and only under very peculiar circumstances (and in not more than two cases) have I entered into a limited competition, even with a certain compensation to all the invited competitors. The system is a degradation to our art, and in no other profession could it have found existence. Its tendency is to destroy all brotherhood, and to foster enmity and narrow-minded feelings of rivalry—to promote envy, malice, and all uncharitableness—among those who should be fast friends. I have no professional enemies, few adversaries, and I attribute this, in a large measure, to my having kept clear of competitions.”

A Glasgow architect writes :—

“I agree with you in earnestly desiring that something should be done. The expediency of putting an end to open competitions (if that were practicable) is a fair subject for discussion.”

A London architect writes :—

“I feel certain that the practice is wasteful and produces no satisfactory results. I have declined all invitations to compete, and have found my practice improve. I believe others would find the same result.”

Another correspondent writes :—

“From a good deal of observation of competitions, I consider that cases, where the conduct and result of a competition are satisfactory, are most exceptional.”

A London architect (who years ago engaged very largely in competitions, and won considerable premiums) writes :—

“No one can hold stronger views than I do—as I look upon competitions as gambling of the worst sort, injurious and demoralizing to the profession to the last degree, and more especially to the younger members of it.”

Another architect writes :—

“I quite agree with all the arguments you bring forward against competitions. There is one however which might be brought forward in their favour, a weak one perhaps, but one not altogether ignored by the younger members of the profession. I have heard it often said that, were it not for the opportunities offered by competitions, young beginners, without name or connection, would not be able to make their talents known. Competition has often done much to give advanced pupils and clerks a start in life, and it is to these, and to advance, or at least encourage, their endeavours and interests, that competition should be resigned by those who, from age, reputation and social position, are able to make their way without its undignified and uncertain help. I consider that no Fellow or Associate should enter into a competition on any terms whatever, and if you succeed in inducing all the Members of the Institute to agree in rejecting all the blandishments exercised by crafty composers of advertizements which fill our professional papers, and to resolve that in future they will not supply designs, except on the usual professional terms, you will deserve the best thanks of all who are anxious to give architecture and architects their proper place, and raise them in public esteem.”

Another London architect writes :—

“If the heads of our profession take a dignified stand, and openly denounce the system of open competitions, it will have the effect of raising our professional position in the esteem of the public in a marked degree. I can probably speak with the more force, as my competition experience has been not altogether of a disappointing nature—as regards its results to myself individually—and the only competition I ever engaged in (and that quite recently) I won, and the works are about to be carried out under my supervision. But the amount of heart-burning, envy, jealousy, and other unlovely concomitants following upon it, has determined me never to enter

upon a similar work again, and I hail with much satisfaction the steps you propose to take to relieve our profession from the liability to such evils."

Another London architect writes :—

"I have never once engaged in any competition, but, from what has come under my notice, I have reason to know that competitions, as now conducted, are unworthy of any honourable profession."

Another London architect writes :—

"I have long felt that the competition system was hollow, false and beyond remedy, and ought to be abolished altogether."

A rising architect, who has been deservedly successful in competitions and whose artistic abilities are very well known, writes :—

"Personally I have been considerably benefited by the competition system, and I should not therefore take any active part in its abolition, though at the same time I should certainly not decline to join in some such scheme as you propose if well taken up by the profession."

A provincial architect writes :—

"I am greatly obliged by your circular of the 1st, and think our profession ought to be obliged to you for bringing forward this subject of competition in the way you propose, and I feel sure you will have the hearty support of every one who wishes to see it raised in dignity. . . . I do sincerely sympathize with you in the movement and when brought before the Institute I would make a journey to London to support it."

Another correspondent writes :—

"I thoroughly sympathize with you, and would gladly support the movement of the Fellows in the way you have indicated, and I beg to thank you for bringing this matter forward. It seems to me that the best way to prevent open competitions is that the people advertizing for designs should receive an intimation from the Secretary of the Institute stating that no Members of that body would be able to send any in."

A London architect writes :—

"I shall be happy to do anything in my power to assist the movement against competitions—which latter appear now (with some honourable exceptions) to be little more than organized jobbery. May I suggest that a preliminary meeting be held to which Fellows be invited."

Another London architect writes :—

"I have your circular and you have my fullest sympathy in the matter, and, if you want it, my best assistance in putting a stop to what is rapidly bringing our profession into contempt."

A provincial architect writes :—

"I beg to say that I heartily sympathize with your project, and should be glad to sign an undertaking not to enter into any competition, where each competitor is not paid for his design."

Another provincial architect writes :—

"Any proposal to oppose the pernicious system of competitions for public buildings will receive my hearty co-operation. I have for many years consistently refused to countenance it. . . . I never reply to an advertizement however intimately I may be connected with those interested. I believe it to be in all cases a sham and a cheat injurious to the interests of the profession and the public. It is sometimes urged in defence that latent talent is developed. I think this is a mistake—I have never known an instance of success unless private interest in some shape has been brought to bear—even admitting this argument the benefit is immensely overbalanced by the mischief."

A London architect, in large practice, writes :—

"I shall be pleased to give my best support to the carrying-out of your proposition for making it incumbent upon Fellows of the Institute to discontinue engaging in any open competition, or in limited competitions, where substantial honorariums are not offered to each competitor. It may be that at first a pecuniary loss would result to some of us from the adoption of such a resolution, but there can be no doubt you are right in saying that, when our determination became publicly known, Committees would hesitate before advertizing for designs, and the ultimate benefit to the profession would be incalculable."

A provincial architect writes :—

"I have a very strong opinion that the present system of competition has caused a degeneration in the practical knowledge of architects, as they find, or think they do, that draughtsmanship pays better than knowledge of construction. At all events from my own experience of provincial architects I consider there is a distinct want of appreciation of the scientific part of the profession of architecture. As far as my own experience goes, I have won several competitions, and carried out the works, but I could have produced better work by being in direct communication with my clients from the first."

A Bristol architect writes :—

"I sincerely hope you will be successful in your attempts to amend the disgraceful system of competitions. I have had a fair share of success, but I have also been a heavy loser of time and money, sometimes under circumstances of a painful nature, on account of the ignorance and unfairness of Committees who settle in one hour what, if competent, would take them a week. I should gladly sign a document never to compete again if the Fellows of the Institute take the matter up as you suggest."

A London architect writes :—

"I so thoroughly object to competitions *in toto*, that I shall be glad to join you and others in any movement which may tend to alter the present system, one which I consider so detrimental and derogatory to the profession."

Another London architect writes :—

"As to competitions, I believe they are vicious and degrading all round."

A Liverpool architect writes :—

"I have for a long time felt the indignity which the system throws on the profession."

A London architect writes :—

"I have for many years given up joining in public competitions, but found myself compelled occasionally to accept an invitation to submit a design in a private competition. With regard to open competitions, in which I had my fair share of success in early life, the works have never been carried into execution with results wholly satisfactory to me, the reasons generally being that the unsuccessful competitors are on the alert to find some opportunity of damaging the position of the successful architect, and it is almost impossible to steer clear through the work without a loss of dignity and a knowledge of having failed to remove unfavourable impressions."

A London architect writes :—

"Believing no less than you do in the inherent vice of architectural competitions, and that it would be for the benefit of the public no less than for that of the profession if they can be abolished, you may count on my best efforts to secure the full consideration by the Institute of the subject. Let me remind you that to have any hope of success you must seek to convince the public and clients that competitions are not for their best interests, which I think may be shown very strongly if not conclusively. Next you rely on the Institute as the only body who may perhaps be able to attack this subject, but if it does it must be the whole Institute and not only one section of it. You must be prepared (as no doubt you know) to find that many now amongst the most eminent of the profession are ready to assert that competitions are beneficial."

Having now given you brief extracts from a few of the forty to fifty letters received, more or less condemning the system of competitions, let me read some sentences from the letters of those who have benefited by it, as they contain information both interesting and suggestive, and which cannot fail to be useful in leading to an impartial review of the whole subject.

One of our Associates in the provinces writes :—

"I am largely indebted to competition for what success I have achieved, and but for them should not have had a chance of obtaining all my larger works. The great advantage of competition is that it gives the younger members of the profession a chance, and it has also an educating influence over the unsuccessful. I believe I have never gone in for a competition without winning or learning a great deal. I feel sure that they have had a very great influence in raising the standard of proficiency in our profession."

A London architect writes :—

"I think it quite hopeless to secure any combined action on the part of our profession—in reference to the important subject to which you call attention—nor do I agree that total abolition of competitions is a thing to be desired."

A London architect, who has engaged largely in competitions, writes :—

"I do not agree with much that you propose. You appear to hope that the competition system may eventually be discontinued. I hope not; and if the 350 Fellows, and all in future to be elected, are expected to sign a declaration that they will never compete unless each competitor is paid for his drawings (I think the signatures will be very few) they would cut themselves off from all competitions. Many architects in good position have earned their fame and practice entirely through competition. . . . The mistake is not in competing, but in the manner in which so many competitions are conducted. . . . The difficulty, of course, is in drawing up the rules by which competitions should be conducted. At present a competition means that each architect must send in a large set of drawings, perspectives, &c., all at great cost of time, and the successful man finds he must then set to work to draw out fresh plans, for the competition ones are never used. The only fair way is to have nothing but sketch plans, to small scale, just to show the general arrangement, and sufficient elevations and perspective to give the outline and idea of the exterior, in fact, if I were asked by a committee to arrange a competition, say for a church, for instance, I should ask half a dozen, or any number of architects, to meet at a certain time, and let them in an hour give a sketch or plan,—the architect's *own* designing would be obtained quite sufficient for selection, and it would not be a matter of number of clerks and longest purse. At present I think very few architects, who have sufficient work of their own, compete, unless specially requested to do so; and any rules that may be drawn up will be almost entirely for those who compete, because they have little to do, and leave it off as soon as it is not longer necessary. When I commenced practice years ago I had little to do except compete. The second competition I sent in for I gained, but the work was not carried out, so I only had the premium. I then was successful for a church and schools, but the chairman, who had a nephew in the competition, was determined I should not carry out the work, and paid me two and a half per cent. out of his own pocket: his relative then did the job. Several churches, schools and other buildings which I have gained have all been carried out satisfactorily; in my own case probably two-thirds of the works I have done (in twenty-eight different counties) have been due to competitions gained, to introduction to strangers through competitions in which I was *not* successful, and to drawings exhibited in the Architectural Exhibition when that was in existence, that also being a species of competition. I never compete now, unless specially asked to, and then very seldom. In the last for a church I refused to compete, unless the committee agreed to *sketch plans on one sheet of paper*; this they did, and I am carrying out the work satisfactorily."

A provincial architect writes :—

"It certainly cannot be said that competitions, as now conducted, are altogether a benefit to the profession but in my own case, and no doubt in many similar instances, young men without influential connections would have great difficulty in bringing their talents before the public without some form of competition, and I for one shall be disinclined to become a Fellow of the Institute if thereby I am debarred from competing, when I consider that the system is likely to be fairly and honestly carried out. . . . As I started in practice unknown in a strange town, I cannot tell how I should have procured a livelihood without the chance of gaining such works as I have in competition, for besides the actual benefit derived from the work so obtained, the fact that I had been intrusted with works of importance secured confidence in my abilities, and private works were intrusted to me."

You have now heard the opinions of the more favoured of our profession, who, having good connections, or succeeding to established practices, have been able to maintain a high position without resorting to competition. You have also had the evidence before you of a few fortunate men who, commencing without friends or interest of any sort, have succeeded by their own talent in raising themselves to honourable positions through the medium of competition, and we may hope to hear this evening the views of some others who have been equally fortunate. But there is a third class who must not be forgotten. I refer of course to the large majority to whom competition has been lamentably disappointing, and who have been tempted away by the allurements of the competition system to give up promising appointments in established offices, which have been filled up by others, who in their turn also have been drawn away in a similar manner, until the profession has been, it is to be feared, overrun with quite an army of men, in many cases not possessing sufficient artistic power to

command success in competition, nor sufficient practical knowledge and experience to be useful in other than very inferior positions as architectural draughtsmen.

What has been the history of the men who have engaged in the preparation of the two hundred and sixty-seven thousand waste drawings made in competition since the time of the Government Offices in 1857? Their history in many cases is written in blighted hopes and ruined prospects. He would, however, be a reckless social politician who dared to suggest the total abolition of competitions at one sudden stroke, and thereby throw out of employment the hundreds who are dependent on this system for occupation. But surely the time has come when some practical steps should be taken to turn the tide and restore by degrees healthy life to our noble profession. Is it so rich, too, that nothing need be said of the half million of money and upwards that has been expended during the last twenty-three years on absolutely waste work. It may well be asked, what buildings have we obtained for such sacrifice? Some few, undoubtedly, of the very highest order. The cost, however, of the waste drawings made in competition since 1857 has not only exceeded the professional commission paid on these grand works, but actually seriously approached (if the Manchester Town Hall be taken out of the calculation) the absolute cost of all that can be looked upon as fairly perfect examples of the respective styles in which they have been erected.

It may be a surprize to some here to be told that in open competitions alone the waste drawings made during the last twenty-three years would, if put on a screen in single file, reach from this room to beyond Grantham and nearly to Doncaster, or piled up flat on their straining frames would exceed by some 1000 feet the highest mountain in Europe.

It is a fortunate thing for our profession, as well as a very remarkable and striking fact, that although architects have exhibited a strong liking for competition, the wealthy merchants of London and the public of the Metropolis, have shown no great appreciation of the system. They have indeed generally discountenanced it, showing that they are too keenly alive to their own interests, and to a sense of the advantages of employing a professional man by direct commission (with whom they can have personal consultation during the preparation of his designs), to trust to the uncertainties of competition; they also clearly believe that they get better served and more handsomely treated by adopting on their part the more handsome and complimentary course.

Although London has almost been rebuilt during the last twenty years, it is very rare to find an instance of a building erected through competition, and even where such has been the case the results have not been very satisfactory, for our largest London competitions (to which I may briefly refer presently) have been a lamentable failure, and most disastrous in their results. If you extend your observation to the suburbs, and even explore the whole of the Metropolitan counties, absence of competition work is equally striking. In the last two years and a half, out of the 117 competitions advertized, only two of any architectural importance have been within the postal district of the Metropolis.

The great arena of competitions has been therefore country districts and provincial towns, and it is not difficult to discover the secret why the competition system has gained favour with so many. I venture to think that it is simply this: that a large number enter the profession with no connection, and with no definite prospects of success, and finding that their efforts in London to obtain business by ordinary means are unsuccessful, they are encouraged to devote

their energies to the provinces and country districts, where local committees are only too pleased to have the benefit of London talent to compete against their own local men. Consequently the professional papers teem with advertizements of country competitions. It may be worthy of consideration whether this practice is not justly open to some criticism from our professional brethren in the country, especially those who are really artistic and clever in their profession, as tending to encroach on their proper and legitimate field of practice. Especially may this be the case in the large provincial towns where architects of great eminence are practising, and who have, in their own neighbourhood even in competition with London architects, generally taken the foremost places; and probably because they compete at infinite advantage, not only having the benefit of local influence, but the opportunity of considering on the spot, as often as they please, all the peculiarities of the site, and of ascertaining from general report the character and style of buildings that are required. They are also conversant with the best local materials available and the cost thereof.

It has been shown, by the history of some successful men, that advantages do occasionally accrue to individuals through open competition, but the great majority of professional men are serious losers by the system, and it is fraught with many practical evils. For instance:—

1. The buildings that are made the subjects of competition are, in the majority of cases, not of sufficient importance to justify their being taken out of private hands of the profession.
2. The instructions drawn up for a competition are generally very vague and imperfect, and the requirements far beyond the sum that is put down to be expended in providing for them.
3. The number of drawings asked for cause an undue amount of labour, and, when given, are seldom examined beyond the one or two of a more pictorial and interesting kind than the others.
4. The constant, or at least not uncommon, practice of architects competing, without even taking trouble to examine the site of the building, and, therefore, sending in designs utterly ignorant of the peculiarities or features of the surrounding neighbourhood, and also of such architects, often having no knowledge or experience of the particular class of buildings for which they are competing.
5. The difficulty and improbability of being able to prepare anything like a perfect design without being placed in direct communication with those for whom it is to be made, and to whom it is to be submitted.
6. The undesirability of selecting any professional man from his drawings only (under the motto system), who may be totally unknown and inexperienced, and who may reside hundreds of miles away from the site of the proposed buildings, and the employment of whom may be consequently disastrous to himself and his clients.
7. The incompetence of committees to select the best design, arising from the fact that very few amateurs have any appreciation of an architectural drawing, except a perspective view, and of their awarding the premium accordingly.
8. The difficulty of securing a fair and honourable selection of the best design, except at very considerable expense, involving the appointment of more than one referee, as it is manifestly unfair to the competitors in different styles to call in only one assessor, who may have special leanings for Gothic or Classic Architecture, or even for a particular phase of these styles.

9. The dissatisfaction created in the minds of all the competitors, except the one who happens to have been successful, and all of whom think themselves, and often with good reason, unfairly dealt with.

10. The baneful influence of the modern practice of unsuccessful competitors ventilating their grievances in the professional papers, instead of accepting their disappointments as the necessary consequence of a system that cannot be exempted altogether from the fallibility and weakness of human nature.

I feel it my bounden duty to at least suggest for consideration some means whereby the competition system may be placed on a more satisfactory footing, and I venture to say:—

1. That the regulations framed by the Institute for the conduct of Architectural Competitions, which have met with the approval of the majority, should be considered in honour binding on all the Members; and it should be understood that any competitions advertized, in which the "Instructions to Architects" violate the regulations referred to, should not be responded to by any Member of our Body.

2. That no building should be considered of sufficient importance to justify a competition, the contemplated cost of which is less than £10,000.

3. That advertizements should (as now) be issued in the professional papers, inviting architects willing to compete to send in their names, and state their experience in designing such buildings as those contemplated, either in carrying out similar works as principals, or in assisting others in such buildings.

4. That the applicants' letters should be considered in Committee, and a selection made of those thought to be most suitable, and in the proportion of one competitor for every £2,000, to be expended—that is to say, five competitors for a £10,000 work, and ten for a £20,000 work, and so on.

5. That each competitor should be paid an honorarium, the successful competitor being employed to carry out the work.

6. That no architect should be allowed to submit a design without having personally inspected the site.

7. That no competition should be adjudicated upon by any single referee.

8. That it might be feasible for the Institute to appoint a Competition Committee (of not less than 10) to adjudicate on competitions, such committee to meet at stated intervals.

During the last twenty-three years the number of competitions annually advertized in the *Builder* has not materially increased or diminished, thus:—

" In 1857,	52 open competitions	In 1860,	54 open competitions
" 1858,	40 "	" 1861,	42 "
" 1859,	45 "	" 1862,	40 "

and coming to a more recent date, no material change has taken place. Most of the competitions, as I have already observed, have been for country buildings and for those in provincial towns, except in the case of the few large Government competitions which have occasionally taken place. The national competitions have not as a rule been satisfactory in their results, indeed you will probably consider them as eminently unsatisfactory; and I will now place before you a few statistics relating to some of the larger competitions.

THE GOVERNMENT OFFICES COMPETITION, 1857.

Without going back as far as the competition for the Houses of Parliament I would prefer to begin upon that for the great Government Offices in 1857. It is an instance of such conspicuous failure that the Government have only once since ventured on an open competition, for in the cases of the Law Courts and the National Gallery a selected number of distinguished architects were chosen to compete, each being paid a substantial honorarium.

The number of designs sent in was 218, comprising from 2 to 30 drawings in each set. A public exhibition of the drawings took place at Westminster Hall in May, 1857, and created great interest not only in the profession but with the public, as about 27,000 persons visited the Hall in the first three days the designs were on view; and it was hoped at the time, from the interest shown, that architecture would become more appreciated by all classes of society. The "Instructions to Architects" were prepared with the greatest care as to detail. The judges appointed to select the best designs were all men of the highest integrity and of distinguished position, and they were assisted in their labours by two eminently practical professional advisers, whose duty it was to examine the drawings and report how far the Instructions had been sufficiently complied with.

Under such circumstances one would have supposed that the result would have been eminently satisfactory. Instead of that being the case, however, some of the very worst evils of competition were conspicuously brought out; for although the "motto" system was adopted, the authorship of a large number of designs was so well known that the anonymous was altogether abandoned, and men of distinction felt that their interests would have suffered had they not acknowledged without reserve the designs of which they were represented to be the authors. It would have been but fair to the less distinguished competitors to have at once placed the real names on all the designs so as to have given them the benefit that might have accrued to them from taking honourable place side by side with the highest men in the profession. For my own part I disbelieve in the "motto" system as being utterly delusive and demoralizing, fraught with every disadvantage both to the competitors and to the promoters of competitions.

This competition was especially characteristic in the development of designs having Italian Gothic features, and some of the pure classic designs were of very high and conspicuous merit. No guarantee was given that the successful competitors should be employed to carry out their designs. Indeed, being an open competition and under the motto system, the Government were too well aware of the risk in making any promise that such a course would be necessarily followed; and in a report of a Parliamentary Committee in July, 1878 (more than a year after the competition), it is stated that—

"Your Committee have duly considered all the circumstances connected with the recent competition for the Government Offices, and satisfied themselves as to the degree of talent displayed in the three designs that have been under consideration; and having also considered the plans which had been previously prepared by Mr. Pennethorne, have come to the conclusion that in the erection of a new Foreign Office a preference should be given to the successful competitors; but at the same time your Committee feel bound to express their opinion that there is nothing in the terms of the competition which necessarily binds the Government to select the architect of the Foreign Office or of the other public buildings from the successful competitors, and that it would be contrary to the interests of the public, where the principle of unlimited competition has been adopted, that the choice of the Government should be thus restricted.

"Public competitions must necessarily be either limited or unlimited. In the case of limited competition a selection is made from men of known ability and competence who are invited to send in designs, and then security is given to the public that whatever difference there may be in their comparative merit, they will all be the designs of men of acknowledged talent, and the execution of the work may then safely be entrusted to one of the competitors. No such security can, however, be given where the principle of unlimited competition is adopted, for until the designs are actually sent in it is impossible to form any idea as to the amount of talent which the competition is likely to call forth, and it would be therefore most impolitic to enter into any previous agreement or understanding which would confine the execution of the work to the competitors in an unlimited competition."

These certainly appear to me to be on the whole very sound principles; and if so, they prove beyond all doubt that open and unlimited competitions under the motto system, as generally practised, are unsound and fundamentally wrong in first principles.

The Government Offices were really three distinct competitions—viz., the Block Plan, the War Office, and the Foreign Office; and it was argued at the time how unwise it was to attempt to settle the detailed buildings until a general plan of the whole was first determined upon. The wisdom of this opinion was proved by the result that a French architect obtained the first premium for the Block Plan; an English firm of architects was awarded the first premium for the Foreign Office, and Mr. H. B. Garling, the first premium for the War Office.

The premiated design for the Foreign Office, in the position arranged for by the Government, could not be worked in with the Block Plan, and the premiated design for the War Office was equally unadapted to be worked in either with the Block Plan or with the Foreign Office—a complication resulting in the whole of the designs being abandoned, and the work of rebuilding a part of the Government Offices being eventually given in the ordinary way of commission to the late Sir G. G. Scott, who, although a third premiated competitor in the competition, was ultimately engaged to carry out, not the design for which he obtained a premium, but an altogether new design prepared by him in a style for which, it is generally believed, he had no great liking. The result you have before you in the new Offices at Whitehall, upon which it would perhaps be unbecoming of me to offer any criticism beyond sincerely lamenting that Sir G. G. Scott was not permitted to carry out his own beautiful competition design in the Italian Gothic style, which would have given much more light and cheerfulness, and was far better adapted in the scale and size of its rooms for official purposes, than the present building. It would have been most acceptable as a contribution to the buildings of the metropolis, and in harmony with the scale of the beautiful adjacent building originally designed by Sir John Soane, and afterwards re-fronted by Sir Charles Barry, and which has been certainly much damaged by the new Government buildings.

The Government Offices competition was not only disappointing from the fact that not one of the premiated designs was ever carried out, but that the Block Plan was also set aside, and the opportunity of making Whitehall and Westminster the site of a magnificent group of Government Offices, which might have been built by degrees, was perhaps for ever lost, as in 1857, the land might have been purchased for a comparatively moderate sum. It has since risen so largely in price, and the very erection of every Government office on an isolated spot further raises the value, as to now render it difficult to acquire the large area of land which might have been easily obtained twenty years ago.

Even at the time of the Government Offices competition, the price of land had risen so much, that while a few years previously land, with new official residences built on it, was

valued at £12. a square yard, in 1857 the same authority valued it at £30. a square yard; but even on this advanced rate it was estimated that the whole of the land necessary to be acquired by the Government to embrace the area of the Block Plan, including the cost of clearing the ground of existing buildings, could have been obtained for about a million and a half. Add to this a similar sum for covering the area with new offices, and half a million for fittings, furniture, &c., about three and a half millions would have completed the work. It is only right however, to say that the late Sir W. Tite was of opinion that the premiated Block Plan involved an expenditure of five to ten millions, and that no country could be expected to embark in it. He also expressed his opinion that the competition had produced but little of a practical character, although the suggestions of the eminent and practical men who had competed were worthy of consideration; and the late Earl Russell desired that the whole of the designs should be set aside, and that the Government should consider what it was they wanted, and what sums of money they were prepared to propose to Parliament to expend.

The award of the premiums, varying from £800 to £100, to the seventeen selected designs really ended this greatest of all national competitions, the Houses of Parliament only excepted; and it was estimated at the time that £50,000 had been expended in the preparation of the drawings, although I venture to believe that to be a very exaggerated estimate, and should think even half that sum was still beyond the real mark.

MANCHESTER ASSIZE COURTS COMPETITION.

Following soon after the Government Offices, an important provincial competition took place, in April, 1859, for the Assize Courts at Manchester, in which the leading provincial and several London architects took part. The cost of the buildings was set down at £70,000, including fittings, and the competition created a large amount of interest. The number of designs submitted was 109, some of them comprising as many as 30 drawings,—indeed one competitor sent in six designs or modifications, and several of the competitors sent in two designs. The designs covered an area of 8400 square feet. The competition was an open one, and under the motto system, but, as in the case of the Government Offices, the authorship of many of the designs was at once recognized, and the style of the drawings of the Manchester architects was so well known as to leave no doubt as to their designs. Moreover it was publicly asserted that the handwriting in some of the reports was familiar to most of the judges.

I believe, however, that the result of this competition was really satisfactory, and that the magnificent building does the greatest credit to the architect, and tended considerably to make his reputation, while it has given general satisfaction to those who are competent to judge of its good planning as regards the purposes for which it was designed. It seems almost needless to add that the successful architect was Mr. Waterhouse, who has carried out the works, and is now as well known in London as in Manchester. The second premium of £150 was awarded to the late Mr. Thomas Allom, known to all for his wonderful artistic power in depicting in colour any architectural subject. The third premium of £100 was awarded to Mr. John Robinson, of Whitehall. The cost of the drawings in this competition must have been considerable, and involved an immense amount of labour; indeed, it was estimated at the time that the drawings of the 109 competitors cost £10,000, and from experience of that competition I think this was not an exaggerated estimate.

In carrying out the work the successful architect would have had to prepare a complete set of working drawings (in addition to his competition designs), and the cost of office expenses and assistance in working drawings, taken at, say, one-third, left him two-thirds as nett profit on five per cent. on the £70,000,—the cost of the buildings,—or equal to, say, £2,350. The profession, as a body, having spent £10,000 on the preparatory drawings for this building, not only lost all their labour, but £7,650 in absolute money paid out of pocket, say nothing of the time and thought of the principals who were engaged upon this important work.

The only other competitions, during 1859, worthy of passing notice, were perhaps, the Cambridge Guildhall, and the Hartley Institution at Southampton. The Houses of Parliament for Sydney in 1860, and the Northampton Town Hall. The Milan competition for a grand monumental cemetery in 1861, where large premiums were offered; and the Thames Embankment competition, which was really more of an engineer's than an architect's competition.

LIVERPOOL EXCHANGE COMPETITION.

The premiums offered were considerable, being £1,000 for the best design, £250 for the second, and an equal sum of £250 for the third; and, indeed, this was the largest English competition since the Government Offices. The problem to be solved was the object of realizing a fair rate of interest for the capital invested, and as the land cost £80. per square yard, it was necessary, in designing these buildings, to utilize every inch of space. Forty-four designs were submitted, only three being of Gothic character; and about fifteen elaborate drawings were required to properly depict each competitor's views.

NEW MUSEUM (SOUTH KENSINGTON) COMPETITION.

Another great Government competition took place in 1864, with the customary ambitious programme of covering an enormous area of ground with magnificent buildings; indeed, so large was the area embraced that it included the whole of the site of the Exhibition of 1862. Thirty-three designs were submitted, and they were mounted on 248 straining frames; some contained as many as a dozen drawings on one frame. This competition was also under the motto system, but again many of the designs were at once recognized. The labour was really enormous, and the results were, as usual, most disheartening and disappointing; for although something has been done, and the Natural History Museum, now being carried out from the designs of Mr. Waterhouse, is the outcome of the competition, the extent and area of even that important building are small compared with the extent of the buildings which the Government desired to be embraced in the competition. The first premium of £400 was awarded to the late Captain Fowke. The second premium of £250 was awarded to Professor Kerr. The third premium of £100 was awarded to Mr. Cuthbert Brodrick, of Leeds. The drawings in the competition must have been very costly, but I cannot say what may have been the loss to the profession for their preparation.

MANCHESTER TOWN HALL COMPETITION.

Exactly ten years after the Government Offices a very important building at Manchester was the subject of an open competition. I believe we are all really proud of Manchester Town

Hall and of the distinguished architect who will be immortalized by that work. Mr. Waterhouse has, so lately as February, 1877, favoured us with a description of that building that it is hardly necessary for me to do more than allude to it. The designs sent in were 136 in number, and out of these ten were selected (Mr. George Godwin being the referee) for further elaboration; and the authors of the designs, eight in number, were invited to a second competition.

In February, 1868, the matured designs of the eight gentlemen were sent in, and each set comprised more than 20 elaborate drawings. Professor Donaldson and Mr. Street were appointed the professional referees to advise the Corporation in the selection of the best design. It will be regretted that their award caused some complication (as more recently in the case of the London Law Courts) from dividing the artistic merit of plan and elevation, but as they were of opinion that the design to which they awarded the fourth place was one excelling all others in regard to plan, and was worthy of a premium in respect of elevation, it seems a pity that it was not at once awarded on its whole merits the first premium, as it might have saved some very natural disappointment to the three other competitors who stood higher under the head of "excellence of elevation." There can be no doubt, however, that the distinguished referees were quite warranted in recommending for execution the design highest in merit as regards *plan*—especially as it must have been well known how capable the author of that plan was to modify his elevations and to make them perfectly suit the requirements of his clients. I must be allowed to say that I was very much struck with the lovely simplicity of the plan, indeed at a glance it impressed one with the complete arrangement, reminding one of the masterly treatment in a similar way of the Houses of Parliament. The cost of the designs in this competition must have been very large, as the drawings were numerous and most elaborate, the building having four façades—all to be artistically treated. Probably not less than £15,000 was spent on the drawings, but at least the profession have the satisfaction of knowing that it is one of the very few competitions which have been successful so far as the executed building is concerned.

I will now come down to more recent dates, and give you some particulars of the competitions which have taken place during the last two and a half years, or rather which have been advertized in the *Builder* between the 1st January, 1877, and the 30th June, 1879.* The competitions have nearly all been in the country, although there are some exceptions, such as the *City of London Schools*, the *Brompton Oratory*, and one or two minor and unimportant ones.

I have endeavoured to ascertain the opinion held by competition-promoters of the system after their experience in having obtained designs and employed the successful competitor to carry them out; and I have addressed over 100 persons on this subject with a view to finding out if they had to do the work over again and obtain designs for similar buildings, which of three courses they would follow: whether—

- a. To select an architect at once in whom they had confidence.
- b. To select a limited number of architects to compete, giving each a sufficient honorarium to cover out-of-pocket expenses, or
- c. To again advertize for designs in open competition.

In nearly all the larger competitions and a great number of the smaller ones, I have been very courteously supplied with the results of the competitions, and while in some cases an opinion

* See the TABULATED STATEMENT, p. 84.

has been given on the points mentioned, some express themselves as incompetent and others unwilling to commit themselves officially as to the course they would adopt had similar buildings again to be erected. If the system of competition were not so freely opened, and any number of designs had for the mere asking, country authorities would most probably be led, I think, to place the work direct in the hands of local architects, or invite a competition among a few of them only. It appears to me that it is especially the small competitions that are bringing discredit and loss to our profession, and country architects have reasonable ground for considering whether they interfere materially with their legitimate field of practice, whether architects away from the neighbourhood, although perhaps possessed with more power of making pictorial and highly finished drawings, can be so well fitted as themselves to know the practical requirements of the locality.

I will take as an example "*Droitwich Fever Hospital*," a recent competition. The cost was to be only £800, and the premium offered was one of £5. Twenty-three architects responded to this appeal, involving, say, at eight drawings to each set, 184 drawings; and putting them down at £2 per drawing this would be £368, or nearly half the absolute cost of the building wasted on preliminary drawings.

RECENT SMALLER COMPETITIONS.

The Maidenhead Cottage Hospital.—This is another instance of the wastefulness of competition. Here the proposed cost was also £800, and two premiums were offered, one of £10 and one of £5. No less than 80 architects responded to this appeal, so that, taking the designs at only two drawings to a set, and the cost of them £2 each, the total would amount to £320, or again nearly half the absolute cost of the building, and eight times the commission paid on the work.*

Basingstoke Hospital.—This, costing £1,200, was competed for by 32 architects; number of drawings say 256, costing £512; commission on building, £60; loss to the profession at least £450.

Llandudno Board Schools.—This, costing £4,000, and for which a premium of only £10 was offered, called forth 19 designs.

Leek Staffordshire Hospital.—This, costing £1,700, elicited 17 designs, which at eight drawings each equals 136, say about £272. Commission on building, £85; loss to the profession, nearly £200.

Shropshire Hospital.—This, costing £6,000, called forth 23 designs, costing at least £408; commission on building say £300, and allowing one-third for office expenses, £200, or a loss of £208 to the profession.

Ashford Board Schools.—The proposed cost was £2,700, and the competition called forth no

* In the north of England, at Lancaster, I have also a case where the cost of the building was proposed to be £3,200, and the premium for best design £25. The number of designs sent in was 42; many of them, if by London men, must have been mere waste paper, for I venture to say few young architects would go all the way to Lancaster to examine the site. In this, seven or eight drawings at least must have been required, and perhaps two perspectives; but still adhering to our £2 principle as the average cost of each drawing this would give 336 drawings, or £672 as the cost of the designs—the commission on the building when carried out coming only to £175, and that without deducting anything for office expenses.

less than 29 competitors (and I venture to say many never visited the site); cost of drawings, say at £2 each, £464; commission on building if executed, £135; dead loss at least, £329.

Jarrow Corporation Hospital. Cost, £4,500; 24 designs submitted; number of drawings, say 192; value, £384; commission on building, £225, less office expenses, say one-third, £75; nett loss to the profession, £234.

Yeadon Town Hall. Cost, £5,000; number of designs, 30, no doubt of an elaborate and artistic character in some cases; cost of drawings, say £480; commission at 5 per cent., £250.

A Lichgate at Carmarthen. Cost, £250; absolutely called forth 36 designs in competition for a premium of £20.

Cirencester School Boards.—Outlay between £4,000 and £5,000; number of designs, 29; drawings, say 232 at £2 each, £464; loss to the profession still very considerable.

Laying-out the Elms Nursery Estate at Taunton.—This, for which a premium of 50 guineas was offered, called forth no less than 120 competitors.

A Drinking Fountain.—This, to be erected opposite a Suburban Railway Station, and for which the liberal premiums of *one guinea* and *half a guinea* were offered, called forth 40 designs.

A Drinking Fountain at Bath.—This was competed for by 29 architects.

Sutton Public Hall.—This, costing only £2,000, drew forth 30 designs. Here again the drawings must have involved much labour, and have been numerous—taking, as before, 8 for each set, the total would be 240 drawings—value or rather cost of which, say £480. Commission on building, £100; dead loss to the profession £380.

Bolton Infirmary.—This, with premiums of £50, £30 and £20, resulted in 36 sets of drawings being sent in. I have not been able to ascertain the cost of this building.

Putney Baptist Chapel.—This, to cost £3,500, engaged the attention of 33 competitors, involving at least 254 drawings, and perhaps one or two perspectives; put the cost still at £2. per drawing, it gives £508 as against £175, the commission on the building.

The instances I have quoted are all from competitions between the beginning of 1877 and the middle of last year. Now, let us consider the more important and costly competitions during the same period. For instance:—

Scarborough Spa Buildings.—This competition was one of enormous labour, as it involved the laying-out of the estate as well as the buildings. £480 was the aggregate sum offered in premiums, and £40,000. was the contemplated outlay. Thirty designs were sent in, and it is difficult to assess the cost of such designs. The commission on the work would reach £2,000; but the cost of the 30 designs in competition would take a considerable proportion of such sum, so that even on this important work the profession were but small gainers, if indeed it was not an absolute loss.

Wakefield Town Hall.—A costly competition, in which 35 architects took part, and which would require at least 10 drawings to each set, or in all say 350 drawings. I do not think any one of these, even by a rapid draughtsman, could have been made in less than three days, even after the studies of the design were completed, so that no set of drawings could have been of less value than £50, thus the whole costing, say £1,850, time and travelling expenses in visiting Wakefield would have to be added, so that nearly £2,000 may, at a moderate calculation, be considered the cost of this important competition. The contract price of the works now being carried out is £43,700, yielding a gross commission of £2,175, and

deducting office expenses, at say one-third, it gives £1,450 nett. Preliminary drawings in competition, costing £2,000, a large loss is involved to the profession, even on such an important competition.

Southport Covered Markets.—This, costing £15,000, drew forth 28 designs, and was, I believe, also a loss to the profession.

Barrow-in-Furness Town Hall.—This, costing £70,000, engaged the attention of 25 architects.

Manchester Baths and Wash-houses.—This competition was for a building to cost £19,600, and it drew forth 31 designs.

Reading Town Hall.—A most unsatisfactory competition which ended in all the premiated designs being set aside.

Brompton Oratory.—This was competed for by 30 architects, and the designs must have been very costly and elaborate. The competition designs varied in estimate between £40,000 and £140,000.

Aston Free Library.—This was the next competition of importance—£18,000 being the proposed expenditure; 19 architects competed.

Yarmouth Town Hall, £26,000. Forty architects competed. The drawings could hardly cost less than £30 a set, or £1,200; and the commission on the building would not exceed £1,300, or not more than about £900 nett after all expenses. Here, again, is an example of a large building being a loss to the profession.

Over-Darwen Town Hall and Market Buildings.—The estimated cost was to be £50,000. Twenty-four architects competed.

Gloucester Lunatic Asylum.—This was to cost £94,000. Twenty-eight architects competed. The drawings in this case were full of labour and of great size, as the buildings involved an enormous frontage. One competitor has given me full particulars of the cost of his designs, and allowed me to see his drawings. The ground plan measured, out to out of walls, 6 feet 5 inches, to a 16th scale equal to 1,232 feet frontage. The set of drawings I examined embraced 3 plans, 3 elevations, no less than 6 sections and a large perspective, in all 13 drawings. The absolute cost out of pocket, without the least regard for the competitor's own time (who I may say personally worked hard at the drawings), was £140. If all spent the same (and some must have spent even more) the cost of this competition would be £3,920. The result of the competition has been that only £12,000 is at present to be expended, which means a mere commission of £600; thus the profession as a body have already lost £3,300 on this one competition.

City of London Schools.—This building was to cost £51,000. Fifty-three designs were submitted. This, again, was a costly competition, and I should fear will bring no financial benefit to the profession, although there is no reason to think it was unfairly conducted. Some, however, were annoyed that no professional referee was called in to award the premium.

I could quote several more examples of all sorts of competitions; and if any cared to take the trouble to investigate the results of all the competitions during the last two years and a half it would be found that the following summary is substantially correct.

The number of competitions advertized in the *Builder* during the two and a half years from January, 1877, to Midsummer, 1879, amounted to 117, or equal to say 47 annually; but these

do not include any that may be only advertized in other professional papers, so that it will be fair to say that at least one competition weekly is advertized, making 52 in the year. The average number of competitors in a competition, I find by careful investigation to be 28. The average number of drawings is not easy to arrive at, but the average minimum number ought not to be taken at less than eight, say at least two plans of the floors, one block plan, two elevations, two sections, and one perspective view. Most important competitions would have 12 or 14, and some more, but let us assume only eight as the average to be on the safe side. This will give 224 for every competition, or 11,648 in the year. If you agree that the average cost of a competition drawing, including all expenses, cannot be less than £2 at the very lowest computation, this gives the outlay annually on competition drawings as £23,296. Taking the same calculation as applying to the 23 years since the Government Offices competition, gives a sum of £535,808, or more than half a million sterling expended on preliminary drawings, for works executed through the medium of competition. I cannot but think, however, that this estimate is really very much below the absolute fact, and that the cost of competition drawings considerably exceeds an average value of £2 each. Moreover the above calculation takes no account of any limited competitions, or any mere local competitions in the country. In round numbers every competition is an absolute loss to the profession of £500, without reckoning anything for the principal's time; and the profession as a body lose annually in competition £25,000 in absolute cash.

I thoroughly believe that to be constantly engaged on competition drawings is the worst possible training for a young man, because difficulties of construction are not entered into by the majority of competitors; should even difficulties of arrangement occur they are slurred over and avoided, under the plea that it will be ample time to consider such points when the competition is obtained, and the working drawings have to be prepared. I believe, also, that the members of the profession have the whole evil quite within their own grasp, and that the public generally are supremely indifferent as to competitions. If they can obtain any number of designs by merely advertizing for them they are pleased to see the pictorial results of their appeal; but if the profession determined as a body not to compete except on reasonably remunerative terms, the public would soon see the wisdom of such action, and business men would admit that work fairly paid for is usually better done than work obtained for little or nothing.



TABULATED STATEMENT OF OPEN COMPETITIONS

Advertized in the BUILDER, from 1st January, 1877, to 30th June, 1879.

DATE OF ADVERTISE- MENT.	TITLE OF COMPETITION.	PROPOSED COST OF BUILDINGS.	PREMIUMS OFFERED.	NO. OF COM- PETITORS.	DATE OF ADVERTISE- MENT.	TITLE OF COMPETITION.	PROPOSED COST OF BUILDINGS.	PREMIUMS OFFERED.	NO. OF COM- PETITORS.
1877.					1878.				
Jan. 20	School Board of Carshalton, Boys' School in Camden Road	£1,600	None	...	Feb. 9	Fulham Union—New Vagrants' Wards	...	1st £20 2nd £10	14
" 20	Brompton Episcopal Chapel, Chancel, Fittings and Pews	...	£10, and 5 per cent. on cost	...	" 23	Laying-out of Bowling Park, Bradford	£9,500	1st £105 2nd £52 10s. 3rd £25	20
Feb. 3	Scarborough Spa Buildings and Laying-out Estate	£40,000	Aggregate of £480	30	March 2	Widner Local Board, Engine Houses, &c.	...	1st £20 2nd £20 3rd £15	15
" 3	Wakefield Town Hall	£35,000	1st £150 2nd £100 3rd £50	35	" 2	Cirencester School Board, School of 500 Children	£5,000	None.	29
" 17	Holbeach School Board—Mixed School for 100 Children	...	None	...	" 2	Aston Free Library, &c.	£18,000	1st £150 2nd £100 3rd £50	19
" 17	Wrexham Market Hall	...	£30	...	" 9	Calne Town Hall, Wilts	£2,000	None.	3
" 17	Lewisham Park Villas (semi-detached villas)	£1,800 average	£30 per house	...	" 30	Llangynider School Board, Mixed School	...	None	...
" 24	Torrington Church Reredos	£250	£5	12	April 6	Yarmouth Town Hall	£26,000	1st £100 2nd £30 3rd £20	40
" 24	South Shields Custom House Buildings	£2,000	£20	18	" 6	Basingstoke, Hospital for Infectious Diseases	£1,200	£10	32
March 10	Sunderland School Board (school for 1300 children)	£10,000	1st £20 2nd £10 3rd £5	21	" 6	Laying Out Public Park at Leicester	...	...	...
" 10	Swansea Union Workhouse Enlargement	...	£50	...	May 11	Llandudno School Board Schools	£4,000	...	...
" 17	St. Austell Burial Board, Chapels and Lodge	£1,200	£15	12	" 25	Leek, Staffordshire Hospital for Infectious Diseases	£1,700	1st, the work 2nd £10	17
April 7	Devonport High School for Girls (120 pupils)	£4,500	£10	7	" 25	Shropshire Ear and Throat Hospital	£6,000	£80	23
" 21	Rochdale Cricket Pavilion	£600	None	6	June 8	Ashford Board Schools	£2,700	1st £20 2nd £10	29
" 28	Nottingham Church Cemetery, Mortuary, Chapel, &c.	...	1st Work at 5 per cent. 2nd £20 3rd £10	39	" 15	Salford, Wilton Hospital	...	1st £100 2nd £50 3rd £25	...
" 28	Loughborough Endowed Schools (Upper School for 10 Day Schools, with Residence, &c., for 15 Boarders)	£4000	None	23	" 22	St. Mary Axe, Extra School Board Schools for 350 Boys	£2,600	None.	10
May 12	Boys School at Bovey Tracey, Devon	£2,500	£10	12	" 22	Jarrow, Corporation Hospital for Infectious Diseases	£4,500	...	24
" 12	Directors of Midland Corporation, West Combe Park Estate, Blackheath	...	1st £150 2nd £100 3rd £50	52	July 13	Additions to Schools at Norwood	£8,000	1st £150 2nd £100 3rd £50	6
" 12	Drinking Fountain and Lamp	£25	1st One Guinea 2nd Half a Guinea	40	" 27	Yeadon Town Hall	£5,000	...	30
" 26	Carlisle Union Hospital for Infectious Diseases	...	None	...	Aug. 3	Wednesbury School Board Schools	...	None	...
June 2	Plymouth School Board (Schools for 300 and 250)	...	1st £100 2nd £50 3rd £25	28	" 17	Rous Memorial Cottage Hospital	...	£50	...
" 9	Sheffield Fever Hospital	...	1st £150 2nd £100 3rd £70	31	" 17	Blundell's Schools, Tiverton	£10,000	1st £30 2nd £20	11
July 7	Southport Covered Market	£15,000	None	...	" 17	New Hotel, Lancaster	...	None	...
" 7	Barrow-in-Furness Town-hall, &c.	£70,000	None	34	" 17	Soudley Schools	...	£50	44
" 14	Manchester Baths and Wash-houses	...	1st £150 2nd £100 3rd £50	...	Sept. 7	Skegness New Pier	...	£50	15
" 21	Burial Board of Basingbourne Chapel and Lodge	£19,600	£30	...	" 14	Bridge over River Runney	...	None	...
" 28	Lewisham Board of Works (Lodge for Recreation Ground)	£1,000	£10 for each school.	...	" 21	Penzance Floating Dock	£25,000	£50	...
" 28	Faversham Grammar School	...	£25	...	" 21	Duffield Burial Board, Chapels and Lodge	...	None	...
" 28	Wellington Grammar Schools	...	None	30	" 28	Lich-gate at St. Peter's Church, Caermarthen	£250	None	36
Aug. 4	Reading Town Hall	...	None	...	Oct. 12	Morecambe Bay Pier Refreshment Rooms	£2,500	1st £15 2nd £5	...
" 11	Hotel at Coventry	...	1st £150 2nd £100 3rd £50	...	" 12	Over-Darwen Town Hall and Market Buildings	£1,500	1st £100 2nd £60 3rd £40	19
" 11	Derby School Board Schools	...	£25	...	" 19	Yeovil Episcopal Church	...	None	...
" 11	Luton Wesleyan Chapel (Sunday School for 1000 Children)	£4000	None	30	" 26	Rivington and Blackrod Grammar School	...	1st £20 2nd £10 3rd £50	19
" 11	Clutton Rural Board Fever Hospital	...	£25	...	" 26	Kenilworth, Sewerage	...	1st £20 2nd £20	16
" 18	Thames Boat House Company (New Boat and Club House)	...	None	...	Nov. 9	Ross, Cottage Hospital	£1,200	...	...
" 18	Long Sutton School Board (Two Schools at Sutton Bridge)	...	£25	...	" 30	Crewkerne Grammar School	£6,500	1st £50 and £15 2nd £10	...
" 18	Prittlewell School Board (Schools for 500 Children)	...	None	...	" 30	Laying-out Elms Nursery Estate, Taunton	...	...	120
" 25	Bolton Museum	£4,500	None	...	" 30	Halifax School Board, Higher Board School	...	£25	...
Sept. 1	Stafford Covered Markets	...	1st £50 2nd £25 3rd £25	9	Dec. 14	Swindon Board Schools	...	1st £200 2nd £100 3rd £50	64
" 15	Swansea, Judges Residences	...	None	13	" 28	Ramsgate Improvements, New Road, &c.	...	...	...
" 29	Chippenham Drinking Fountain	£200	£5	...	1879.				
Oct. 13	Maidenhead Hospital for Infectious Diseases	£800	1st £10 2nd £5	...	Jan. 11	Johnson Hospital, Spalding	...	1st £30 2nd £75	28
Nov. 10	Lancaster Centenary Congregational Chapel	£3,500	£25	...	" 11	Gloucester Lunatic Asylum	£94,000	Two Premiums of £75 each, and work to successful competitor	50
" 24	Oswestry School Board Schools	...	None	42	" 11	Greenock New Municipal Buildings	£80,000	1st £30 2nd £20 3rd £10	43
Dec. 8	Droitwich Hospital	£800	£5	23	" 25	Laying out 40 acres in Streets and Building Plots at Southport	£50,000	1st £150 2nd £100	...
" 8	Sewerage of Kingsbridge and Doderooke	...	None	...	" 2	Stoke-upon-Trent, Sewerage	...	1st £300 2nd £200 3rd £100	53
" 29	Ripley Market House, &c.	...	None	17	Feb. 1	City of London Schools, on Thames Embankment	£51,000	1st £50 2nd £25 3rd £30	19
1878.					March 15	Ipswich Post Office	£6,000	1st £50 2nd £25 3rd £25	...
Jan. 5	Bolton Infirmary	...	1st £50 2nd £30 3rd £21	36	" 22	Wolverhampton Public Park, 47 acres	...	1st £100 2nd £50 3rd £30	45
" 12	Oratory, Brompton	£2,000	None	...	" 22	Wesleyan Theological Institution, Birmingham	£23,000	£120 in all	86
" 19	Glasgow Working Men's Investment and Building Society—(Model Houses)	£40,000 to £140,000	None	30	" 29	Orme Billiard Table Design Competition	...	None.	18
" 19	London Pavilion Music Hall	...	1st £52 10s. 2nd £31 10s. 3rd £21	8	April 5	East Cowes, Sewerage	£5,000	1st £50 2nd £25 3rd £25	...
" 26	Ealing Vestry Hall	...	None	20	" 12	Ipswich Museums, Free Library and Schools of Science and Art	£10,000	1st £100 2nd £50 3rd £25	28
Feb. 2	Fountain at Bath	...	None	29	" 12	Devonport Public Hall	Architect's estimate	...	...
" 2	Congregational Church at Brighton	...	None	...	" 12	Hull Borough Asylum	£46,000	...	...
" 2	Midland Great Western of Ireland Company—Estate and Artizans Dwellings	...	1st £100 2nd £50 3rd £25	...	" 26	Shepton Mallet Hospital	£3,000	None	...
" 9	Sutton Public Hall	£2,000	£20	30	May 10	Spalding Grammar School	...	None	...
" 9	Heaton Cemetery	£8,000	1st £75 2nd £30 3rd £20	30	" 24	Basingstoke Baths, &c.	£1,000	None	8
					June 14	Baptist Chapel near London	£3,500	...	33
					" 28	Colton Hospital Convalescent Home	...	1st £100 2nd £50	...
					" 28	Bulkeley Memorial, nr. Beaumaris	£1,000	£10 10s.	...

* In some cases it has been impossible to obtain from the local authorities information as to the number of competitors and the proposed cost of buildings.

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Not Imaged

DISCUSSION.

Professor KERR, *Fellow*.—In response to the Chairman's invitation, and without the slightest preparation, I may perhaps say that I have conducted my competitions with more success than is generally known, and with less expense than has been suggested by the author of the Paper. Perhaps, however, that arises from the quarter of the country from which I happen to have come, or perhaps it may arise from the circumstance that I could always do my own work myself, and never was obliged to employ anyone to do any part of it. The drawings I prepared for the Government Offices Competition in 1857, to which allusion has been made, cost me (including a perspective 7 feet long) only £15.; but then I was a young man and could work well. I remember well how I did it. I lived at Wanstead at the time, and I put the drawing in pencil—doing the leading lines of the perspective—during the day, and took it home to Wanstead. I there put it in ink during the night, and I used to fall asleep with sheer fatigue as I went along the road; and that is an instance of the work which fell to my share in early days. The drawings for the Natural History Museum Competition at South Kensington cost me very little money, but I believe other competitors spent a great deal. I think that that competition, as the lecturer suggests, was a most signal failure, and the results were somewhat curious. Of the two premiated designs submitted to the Trustees of the British Museum they preferred mine, and the then Chief Commissioner of Works could not help the preference, but Captain Fowke's design was ultimately approved. On his death the scheme was altered, and Mr. Waterhouse was called in to erect buildings on a new plan altogether. One's opinion of competitions is in every place in accordance with one's own experience. I have always thought that it is of no use going into a competition unless you are sure to win! Yes, and the way to win is perfectly well known. The man who knows how to win a competition does win, and the man who does not know does not win. That is my experience, and I do not mind telling you exactly what I mean. The winner of a competition must in the first place produce the best plan, and to do this he must go to work so as to get the best information; that is to say, it is only by getting the very best information—you know what I mean—that you can start at all. I got the best information at South Kensington, only Captain Fowke somehow got better. In the next place the winner of a competition must produce the best exterior; if he cannot do it himself he must get somebody else to do it for him. Lastly, he must have a friend at court, as that is essential.

CHARLES FOWLER, *Fellow*.—The extraordinary mania on the part of architects to go into competitions is the more remarkable as it is not confined merely to the younger members of the profession. This has been the case in open competitions, where perhaps the prize itself is not the very highest to be gained when you get it, and of course there is only one who can get it. There must be some attraction in the mere fact of competing, and I think one great reason why many young men engage in competition is this: they of course have some hope that they will succeed in getting a premium. I do not, however, think that that is the principal attraction to them; it really lies in making a design of their own, without control or

assistance from anybody else. A man does not set to work to make a design without any purpose whatever; there is not sufficient attraction in that. The thing wants to be put before him in a definite way, which he cannot do for himself; and when a competition is advertized, or otherwise made known, to produce under certain conditions a building for certain purposes, he has a problem set before him and he sets himself to work it out with perhaps the vaguest hope of success, and simply because it is a problem which interests him. That competition is desirable on certain conditions, and within certain limits which are difficult no doubt to fix, I think we shall all probably agree. That it is an advantage to younger members of the profession who may not have other opportunities of bringing their talents or their skill before the public I think is undoubted, but that such competitions should be conducted under some kind of rules I think we shall all also agree. That local bodies utterly ignorant of all the necessary points in a building, who have no idea of the requirements of that building, should invite a competition, in which they say such and such accommodation is wanted, to cost, say £5000., whereas the building would cost £15,000. or £20,000., is of course utterly absurd. The difficulty no doubt is to ensure that the persons who propose a competition shall do so on some reasonable and fair grounds. I confess, sir, I should like to see that, except in great national or quasi-national buildings, the senior members of the profession should not engage in competitions, and this for two reasons:—1, because it would be handsome behaviour on their part if they left all works except those named to be tried for by the younger members of the profession; and 2, because then the senior members might perhaps obtain more influence in regulating the conditions of competitions, as they would occupy a more independent position. I think it would be a great pity to attempt to do away with competitions altogether, but the Institute might try to have the conditions of competitions more fairly drawn up than they generally are. If the design made by the winner of a competition be good, he should have the work intrusted to him for execution, and that is a point on which architects might fairly insist.

EWAN CHRISTIAN, *Member of Council*.—I do not think the money question ought to be the principal thing considered. Of course, as Professor Kerr says, it is possible for people to go into competitions on a much lower scale of expenditure than that stated by Mr. Porter, but as one who owes all his success to competitions I may state my own experience. I have only engaged in a few, and always succeeded except when I deserved to fail, and I agree with Professor Kerr's first observations though I differ entirely from the last. There is in my judgment only one way of ensuring success, and that is by taking the greatest possible trouble and making yourself master of your subject. Unless you learn everything about the work you have to do, take an enormous amount of pains, and give an abundance of time and brainwork to the design, there is and there ought to be no chance of success. But I do not agree about the "friend at court." My own experience has been exactly the contrary. In every competition in which I have been engaged I have done all in my power to prevent my name being known, and I have been fortunate enough to win my work without a friend at court or a friend on any committees. I think if competitions were given up it would be a very bad thing for the rising men. When very young I went into competitions for the love of the work, and a very good thing it is for young men to try their "prentice hands" in this way. Let them try and fail, and fail again if they must do so. The best thing they can do is to work

on until they achieve success, and they will have a great many failures before they arrive at that, but the final result is sure if they have the ability, and will only go zealously and carefully to work. I have had some experience in adjudicating upon designs sent in competition: I have seen sometimes thirty or forty sent in and not more than half a dozen worth looking at at all. Their authors had not worked on the principles the professor has laid down of doing the work to the best of their ability, getting the best information and giving their full power to it. They had got up some showy drawings and their thought had been less of construction than of what would please a committee. That is not the way to go to work. You must have a thoroughly good plan to begin upon and work everything out according to that plan. I suggested some two or three years ago what was considered a novelty in the way of competition. It was not an original idea of mine but suggested by Mr. Clutton—a very able man—and was to the effect that there should first be an open competition for sketch plans. I proposed that with reference to a church competition. Ninety-six sketches were sent in—just little plans which could be prepared in the course of a day or two, and yet fully illustrate the architect's intention. Out of those ninety-six I had to select six. It was not a difficult task. The six selected had to compete for the finished work. The men who were successful carried the work out and within their estimate, and since that they have had, I believe, other work given to them in the same district without competition. That is the natural result of doing work well. The only road to success which was open to me when I was young, and it must have been the same to many other men, was to get something in competition. I had no friends to depend upon, and nothing whatever except such merit as my work might possess, and one introduction led to another as it always does. So the tree has grown, and it always does grow after a time. I should be very sorry to see competition put an end to. I believe that properly conducted it is a good thing, but it depends upon architects themselves whether or not competitions are fairly conducted. If men would only go into the business fairly and honourably, never ask for a vote, never ask friends to help them, but simply depend upon their work alone,—then I think that competitions might result in something good. Whether we shall ever arrive at that happy state of things or not I do not know, but I believe it is the only right way. Of course it is very important that there should be competent judges appointed, but every man ought to try and do the best that lies in his power to help onward a just procedure in architectural competitions.

R. E. POWNALL, *Associate*.—No reference has yet been made to the Conference of 1872. As at that time comprehensive regulations, which have since been largely issued, were suggested upon the subject of competitions, it may be information to many here that, in 1877, considerable movement occurred in the Architectural Association upon this very question. Means were then taken to ascertain the feelings of the members generally on the subject. A circular was sent to each member requesting an answer to a series of questions. With those questions were incorporated the regulations of the Institute, and members were asked to state whether they recognized the conditions as fair or not. They were also asked for further suggestions, and whether they considered it desirable that members of the Association should be asked to pledge themselves not to compete upon any other than fair terms. The result was most satisfactory. About 20 per cent. (the proportion of senior members of the

Architectural Association) replied, and at great length, to that circular.* When brought before the General Committee of the Architectural Association, it was felt that we were in this particular position:—The Association, although containing a considerable proportion of men in practice, exists purely for an educational purpose; any action taken would be by the Association only, and therefore not being sufficiently extensive would not do widespread good. An application was afterwards made to the Institute and much correspondence ensued. In the end a committee was formed by the Council of the Institute to see if any fresh arrangement could be made. After a consultation that committee came to the conclusion that, inasmuch as the resolutions of the Conference of Architects were put forward so lately as 1872 (it was then 1877), no further good could at that time be done. The Council, however, recognized that there was some need of action in the matter, and they therefore issued a circular on the subject to all their members, in the following terms:—

DEAR SIR,—We are requested by the Council of the Royal Institute of British Architects to call your attention to the “General Rules for the Conduct of Architectural Competitions,” drawn up and published by the Institute in 1872, after having been previously submitted to and approved by the General Conference of Architects held in that year.

Copies of those rules have since been officially sent to the promoters of the principal competitions advertized, and the result has in some cases been satisfactory. But, inasmuch as the conditions have generally been issued to competitors before the competition is advertized, the suggestions conveyed by the Institute rules are often not acted on, because they are not known in time.

In order to give practical effect to the rules, the Council beg that you will kindly give them the earliest information which you may have of any professional competition likely to take place, in which case the rules shall be forwarded forthwith to the promoters of such competition.

With reference to the main point of this circular I may perhaps mention, as indirectly bearing on some of the remarks made this evening, that a great authority on the subject of competitions remarked in my hearing:—“It is absurd to suppose that one who has done his best to get you the work *without* competition will not use his influence for you *in* it.” Indeed, one of the points brought out by the Association was the desirability of an open sketch competition as already mentioned. That was adopted as we have heard in the case of the Manchester Town Hall, also in the Shakespeare Memorial Theatre, the Scarborough Spa, and the church Mr. Christian mentioned. The result is a gain in every way to the competitors. If that particular suggestion could be incorporated in any new rules of the Institute it would be a step in the right direction. After all, those rules seem rather half-hearted. There is “must” in one place and “should” in another, which brings them down to the level of “suggestions.” I should prefer to see them really *regulations* and adhered to; at present it is difficult to distinguish which they are.† Lately a great deal has been heard about competitions. Men

* The information thus obtained was tabulated, and it was found to be agreed by majorities varying between ten and twenty to one, that—

1. Some steps ought to be taken.
2. Under certain circumstances members might be asked to pledge themselves not to compete on other than fair terms.
3. The Institute regulations generally were accepted as fair terms.

† The General Rules of the Royal Institute of British Architects for the Conduct of Architectural Competitions are:—

1. The Promoters of every competition should appoint one or more Professional Assessors, whose names should be published in the Advertizements and Instructions. It should be the duty of these Assessors—
(a.) to advise upon the details of the Instructions;

have felt themselves aggrieved by the way in which some competitions are conducted, and out of this soreness possibly good may come. I may perhaps say that a certain few who often compete have formed themselves into a kind of voluntary society for the purpose of obtaining from those who habitually compete a promise not to compete for say a year, except in cases where a professional assessor is appointed. The new Society takes that ground upon the principle that half a loaf is better than no bread. It is thought that if a professional assessor is appointed we shall stand then some fair chance of our drawings being considered on their merits, and thereby avoid many of the present abuses of the system. As to whether competitions are good or bad I think that is utterly beside the mark.

ROBERT WALKER, *Fellow*.—The subject of competitions, especially to those who are in the younger and middle stages of their professional career, is a very important one. I cannot myself go the length Mr. Porter has gone in trying to prove that competitions, if not entirely to be abolished, ought to be steadily discouraged. We have to remember that we live in the midst of competition; it is the rule everywhere. Whatever we may say or do in our capacity as members of a learned society, the outside public, and the corporations who pay for the buildings, eventually settle these matters. We may make certain appeals to their sense of

(b.) to determine which of the designs conform to those Instructions;

(c.) to exclude all others; and

(d.) to advise the promoters on the relative merits of the designs admitted to the competition.

2. Every member of the Committee of Adjudication and every Assessor must necessarily abstain from taking a part in the competition, or in the execution of the proposed work.

3. The number and scale of the required drawings must be distinctly stated, and they should not be more in number or to a larger scale than necessary in order clearly to explain the design. If perspective views be required, the Instructions should be such as to ensure uniformity of size, number, mode of colouring, &c.

4. The Instructions should clearly state whether the plans are to be marked with the author's names or with mottoes, and whether the amount proposed to be expended will be strictly limited, or may be considered as approximate only.

5. Designs ought to be excluded from competition—

(a.) if sent in after the period named (accidents in transit excepted);

(b.) if in violation of any of the Instructions;

(c.) if they do not substantially give the accommodation asked for;

(d.) if they exceed the limits of site; and

(e.) if the Assessor (with or without the assistance of a Surveyor), should determine that their probable cost will exceed by ten per cent. the intended outlay, or the estimate of the competitor.

6. All submitted designs, *unless excluded under Rule 5*, should be publicly exhibited *after* the final award. The report of the Assessor and the decision of the Committee should be published at the time of exhibition.

7. It should always be an undertaking by the parties inviting plans in competition, that—subject to compliance with the conditions, especially as to a tender being obtained within ten per cent. of the competitor's estimate—the author of the design declared to be the best is to be employed on the work if carried out, subject to any special arrangements which may be recommended by the Assessors in the interest of the work.

8. The first premium should not be less than one-half per cent. of the proposed outlay; it is not to be merged in the commission, but must be subsequently increased by one-half per cent. if the premiated design be not carried out, or if the work be abandoned. Other premiums should be offered, the aggregate amount of which should not be less than one per cent. upon the intended outlay, divided into as many premiums as may be convenient. The above applies to works over £10,000 in value; in the case of smaller works the percentage of remuneration should be increased. In cases of *limited competition* each competitor should receive some payment in order to meet his expenses.

9. Designs for which premiums have been adjudged and paid ought not thereby to become the property of the promoters.

honour and their business spirit, and we have a right to do so because we contribute to those rates which they administer, but I think that the time has gone by when we can talk in any way of abolishing the system. It is not wise for individuals to attempt to do this though the Institute may take up the matter with good grace. And do not let us speak too much about the loss to the profession. All professional men lose time for the general good, and notably medical men—especially the younger members of their profession; and the reason so many local architectural competitions are advertized, which local men might undertake without competition, is on account of party rivalries. I agree with the gentleman who said that experience gained by young men in making these drawings was useful to them in after life; the great bane, however, is the “dodgy” way in which drawings are got up. How many perspective drawings are taken from a point of view in which any person could view the building? and if this is the case with a professional man, what kind of idea must such a view convey to the gentleman who adjudicates upon it? I would abolish perspective drawings, for they are too often given merely to misrepresent facts. It is often said that the decision of the expert should be final. I do not believe that any body of English gentlemen will ever consent to such a rule. Elected by the people, whether as mayors, aldermen, or what not, I think we ought to recognize them as judges, and at any rate bow to their decision. At the same time we ought to insist, as professional men, that they shall take competent evidence of professional experts to guide them in their decision. We cannot insist that the views of those experts shall be finally adopted. If we try to enforce the rule of having a referee or referees we shall carry the public with us, and it will lead to a reform in the competition system. A great deal was said about the labour expended on drawings in competition, but it would be found on examination that two-thirds of them are practically worthless. I quite agree with Professor Kerr that the best thing is to get the best plan, but not that the next best thing is to get information from the competition committee. If we can only get the referee principle carried we shall have far less heart-burning than now, and probably reduce the drawings in number.

CHARLES BARRY, *Ex-President*.—I feel indebted to Mr. Porter for the great pains with which he has laid before us the means of forming an opinion upon one of the most difficult questions that exercises the profession. It has doubtless struck everyone that his collection of data must have involved an expenditure of much time and trouble. I have always expressed and still hold an unlimited objection to competition. I have heard nothing to-night which has in the least degree altered my feeling. Every speaker has, one after another, suggested palliatives of something confessedly rotten in itself—in the terms, in the inception, in the giving out of instructions, in improper practices of obtaining what Professor Kerr so euphemistically calls “information,” and finally in the mode of arriving at a decision. I think that Professor Kerr, with his great knowledge, would have obtained precisely the same success and professional distinction if he had never competed at all; and I have no doubt, in my own mind, that my friend Mr. Christian would have been Mr. Christian, honoured, recognized and in large practice, if he had not succeeded in that famous case of his—the Scarborough Church. Another speaker, my friend Mr. Charles Fowler, suggested a rather humorous reason for young architects entering into competition, one which I think is utterly fatal to the object of architectural competition. Practically, he says, a number of young men go into it for the fun of the thing. Ought that to be the object of employers in seeking

a plan for a building? Suppose such employers fall upon one of those hap-hazard drawings unthought of seriously, and coming from inexperienced hands, are they not likely to find out in the end that they have fallen into the hands of one who is simply seeking experience, and who cannot carry out his design even if called upon to do so? A good many of the remarks have been merely personal, but I venture to think that Mr. Porter has asked us to take a much broader view of the question than one implied by mere personal experience. He has asked us to consider it not as it affects individuals, but as it affects the whole profession, and the influence of that profession upon the public. The question really is:—What is the profit of the competition system? and you must look at the profit from both points of view. Is it a profit to the profession? Is it a profit to the public? First, with respect to the profit to the profession—although, of course, as he very candidly and properly admitted, there are some rare instances of success in competition—he is able to put before us undeniable, lamentable and heart-breaking failures compared with which the few instances of success have been trifling indeed. Therefore I cannot help thinking with him that any profit, gained by the profession as a profession, is far too dearly bought. Then, secondly, as to the profit of the public. Is it at all desirable that the public in inviting competition should do so or be led to do so, or should be able to do so on the principles on which they too generally do? Is it fair that they should make a profit in the sense of having 50 designs when they pay for the cost of less than one? Surely not, and, let me add, it is a kind of profit that is demoralizing in every sense of the word, and is entirely different from competition in the law, the civil service and so on. The question in those cases is whether a man at a particular time shall attain a particular rank, such as he goes in for. He takes his chance, and he either gets it or he does not. That is not in any way a parallel case to the invitations to competitions, where men of professional skill give their time and trouble, and then are coolly dismissed with a small payment—not the reward they seek in the erection of the building, the design of which they are asked to execute, but a premium, and in some cases not even that. I am not sanguine enough to think that a system, which is unfortunately so deeply rooted, will be departed from, or even seriously affected, by the Paper before us; but I do think that it is the beginning of the ventilation of opinion on a subject most interesting to all architects, and which deserves far more consideration than can be given to it to-night, and which may gradually, and after repeated efforts, result in benefit to ourselves. That there is a radical evil there is not a man here denies. People take different views, but none of them support it as a system. Even those who have ventured to say that they would be sorry to see it abolished have pointed out such serious objections as to counterbalance their own wishes. I do repeat a hope that this initiation of the subject will only be initiation; that it will be thought of carefully and deeply by us all, and that many another discussion will gradually lead us to reform a system which we all must at heart feel to be professionally injurious.

The Discussion was then adjourned.

* * * The following extract from a letter, written about six years ago, by the late Edward M. Barry, R.A., *Vice-President*, expresses what the lamented Professor thought about this subject:—"I have received your letter, by which I learn that the Committee of (who are strangers to me, and of whose names I am ignorant) have

done me the honour to invite me to submit designs in competition with five other architects for a proposed new building. I do not gather from your letter that any payment is proposed to be made to the competitors. I have to ask you to express my best thanks to the Committee for this mark of their confidence, and, as I am sure that the invitation was intended as a compliment, I feel it due to them to acknowledge it gratefully. Considerable experience has led me, however, to the conviction that competition is one of the worst modes of obtaining good designs, and that it is bad for the employer, bad for the architects, and bad for art generally. It is bad for the employer, inasmuch as, among other reasons, it prevents that intimate communication of ideas with the architect, *during the preparation of the designs*, which is necessary to prevent future disappointment, and even to secure a correct understanding of what is ultimately proposed. This is one main reason why so many complaints are heard (when it is too late) that the convenient use of the building has been sacrificed to mere showy considerations, such as it is the tendency of competitions to foster and develop. It is bad for the architects, inasmuch as five men of eminence are expected to waste their time, labour and even money, as no architect can prepare competition designs without incurring considerable expense. Nothing of this kind is expected of other professions, but when advice is required it is sought from those whose reputations and works before the public constitute a guarantee of efficiency. No one thinks of asking six eminent lawyers or six physicians to expend their ability and funds in order that one among them may receive professional employment. It is bad for art generally, as it induces the preference for showy drawings to really good architectural design, and because it generally ends in disputes and heart-burnings."



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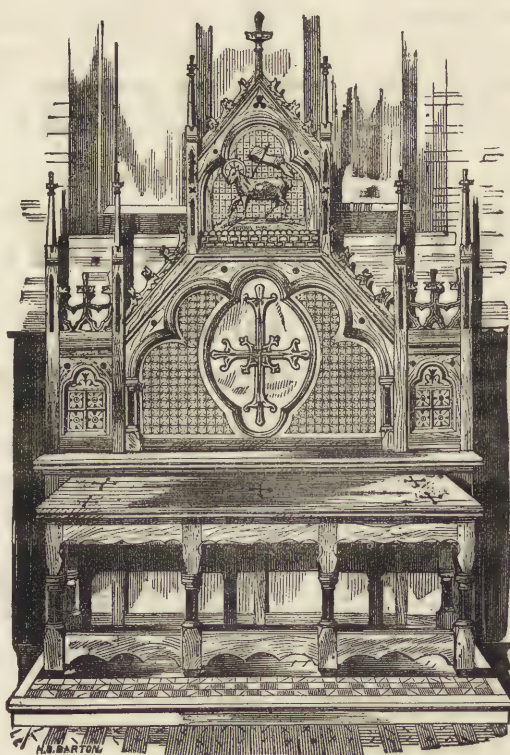
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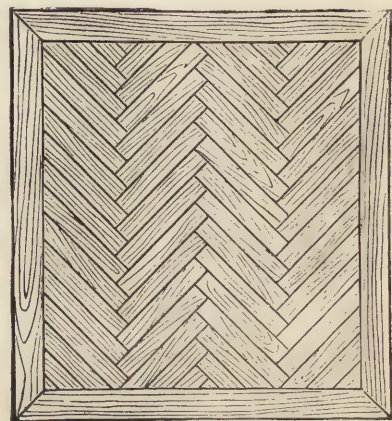
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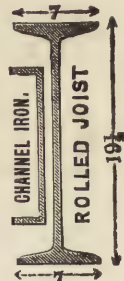
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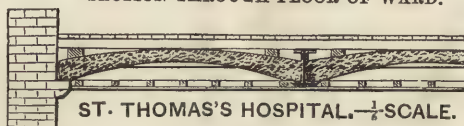


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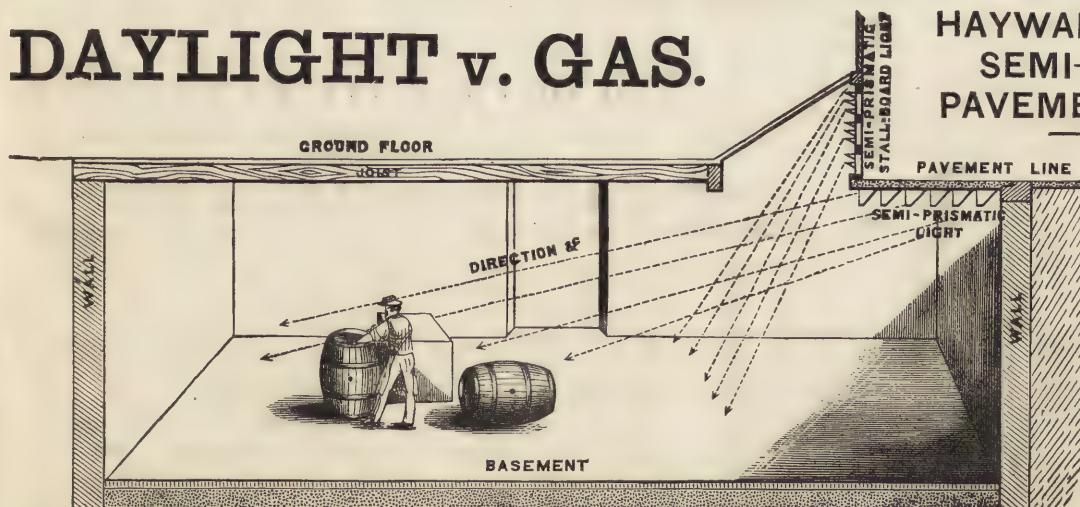
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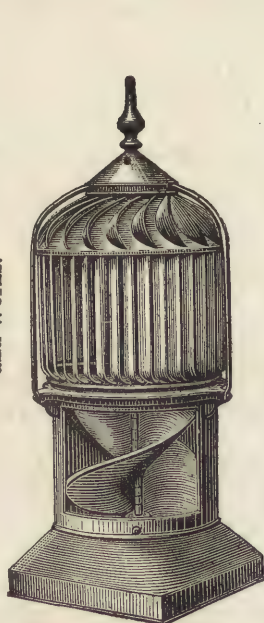
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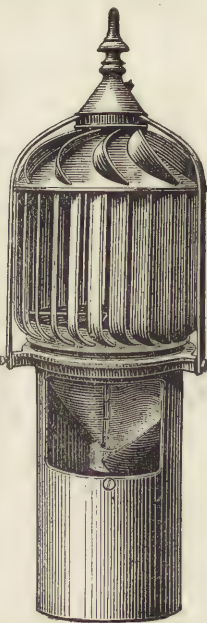
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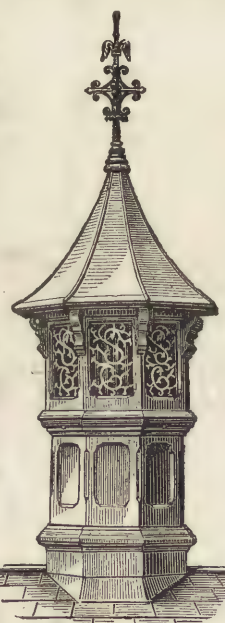
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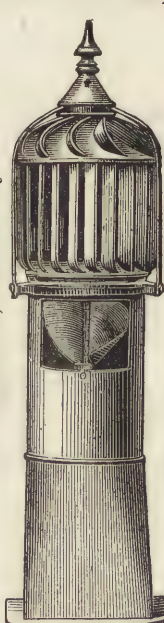
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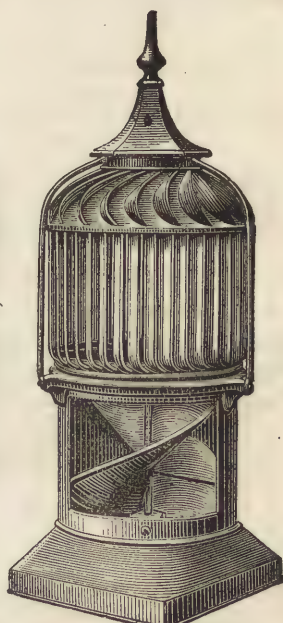
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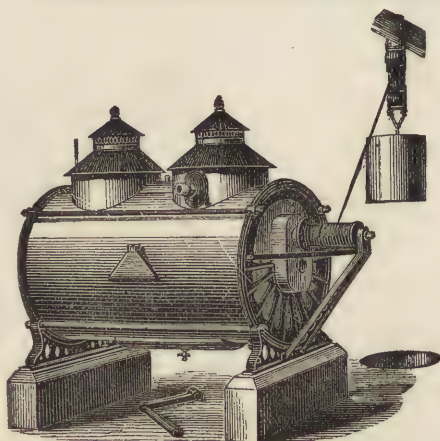
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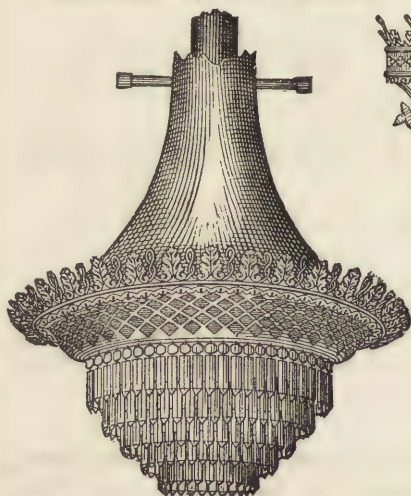
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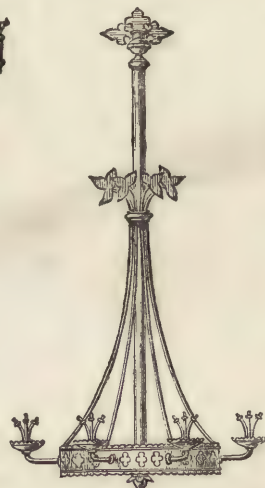
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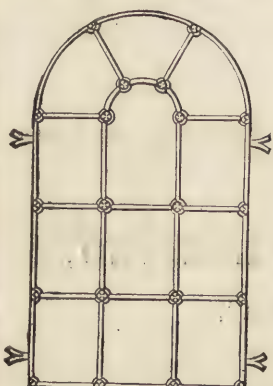
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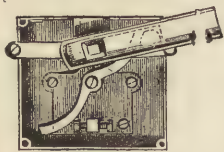


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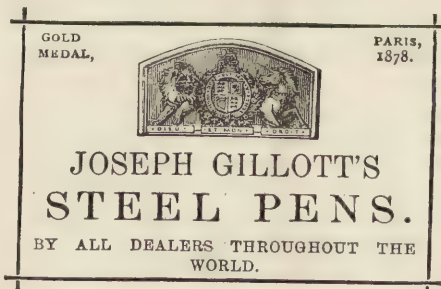
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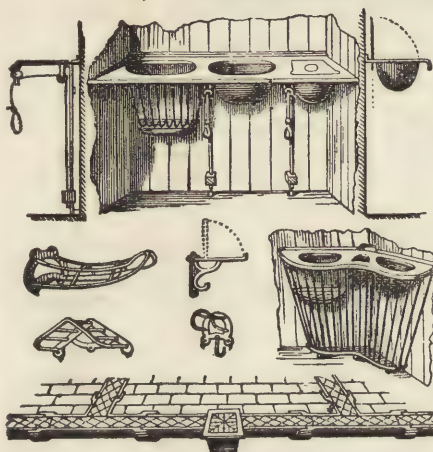
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WITHOUT SPRINGS,

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It is fixed when used by itself at the junction of the sashes on one side and is released by means of a single line; closing the sash automatically brings the Fastener into action. If the *SASH OPENER* be combined with the Fastener (see illustration), as is very convenient in heavy sashes, one pair of lines for opening and another for closing are used.

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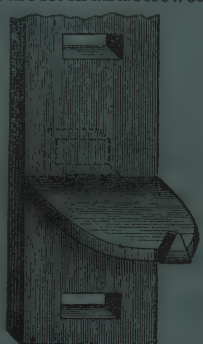
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No. 5.

TITLE OF PAPER.	AUTHOR'S NAME.	
I. Opening Address	John Whichcord, F.S.A., <i>President</i>	Dec. 1st, 1879
II. Frederick Pepys Cockerell: a Memorial Sketch	.....	Dec. 15th.
III. Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S.	Jan. 12th, 1880
IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.
„ Adjourned Discussion on ditto	Sir Edmund Beckett, <i>Q.C.</i> , <i>Hon. Associate</i> , Professor Kerr, <i>Fellow</i> , and others	Feb. 9th.

SESSIONAL MEETINGS: MONDAY EVENINGS.

1880 FEBRUARY	9 —23	1880 MAY	3†—24
MARCH	8†	JUNE	7§
APRIL	5 —19		

† Special Meeting.

† Annual Meeting.

§ Presentation of Royal Gold Medal.

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PARIS INTERNATIONAL EXHIBITION, Class 66, 1878.

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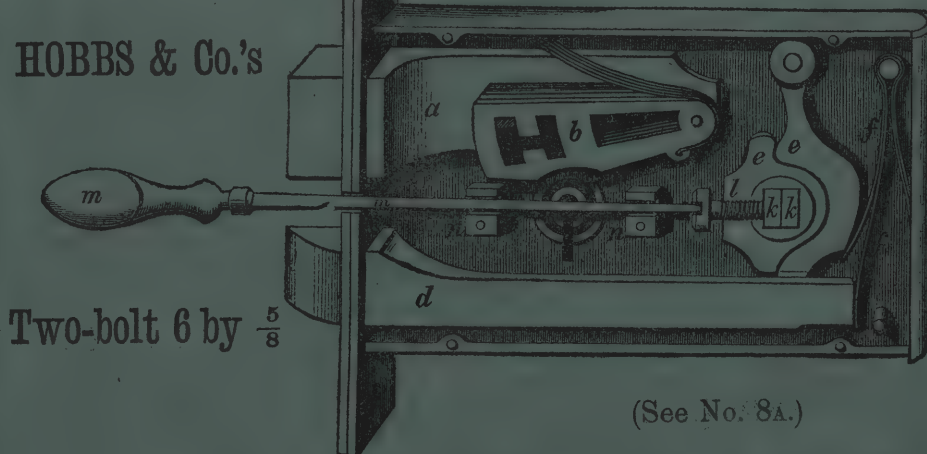
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ADJOURNED DISCUSSION ON ARCHITECTURAL COMPETITIONS.

SIR EDMUND BECKETT, Bart., Q.C., *Hon. Associate*.—Mr. President, I wish it to be understood that I am only going to speak on this Paper of Mr. Porter's at your special request, for the following reason:—The question before you is not the general one of the expediency of architectural competitions, but the purely professional one, whether this Institute ought to prescribe any terms on which its professional members are to engage in them, and how far you can do so with success. I need not remind you that the constitution of this corporation is peculiar, and I believe unique, among the "learned societies" of England. It has undergone some changes within my memory. I remember when you had not merely non-professional Fellows, but non-professional Presidents, which the charter expressly authorizes. Besides the "Fellows," who are to be practising architects of seven years' standing, it provides for "Honorary Fellows," who are to be unconnected with building as a trade or business; and also for "Associates," who are persons engaged in the study or practice of architecture for less than seven years, and who may become Fellows. After some years you ceased to elect non-professional Presidents, and I think rightly. Then, in the time of your last predecessor, you invented by some new by-law a new order, not contemplated in the charter, and invited a considerable number of us who are supposed to be interested, if not learned, in architecture to become "Honorary Associates," with the right of speaking here, but with no right to interfere in the management: in fact, exactly what the charter calls "Honorary Fellows," who were also to have no right to vote, or hold any office except that of President. That being so, I should not think of coming here to advise you on the purely professional question of what you ought to do in the direction that has been suggested by so many of the writers and speakers whose opinions you have heard. But as you have asked me to do so I will not shrink from it, and have put aside another engagement in order to comply with your request. I may begin by reminding you that in a Discussion here, nearly six years ago, on the "Hope of Architecture," in which the general question of architectural competition arose, I spoke pretty strongly against it, and elicited from your eminent predecessor, Sir Gilbert Scott, these memorable words, when I said that you all make very different designs for a competition from what you would if you were employed independently, and he exclaimed, "We are obliged."* Probably nothing could have been said more condemnatory

* See the TRANSACTIONS, Sess. 1874-75, p. 76. The incident to which allusion is here made occurred in the Discussion on "The Hope of English Architecture," a critical essay which had appeared some time before in the *Quarterly Review*. Sir Edmund Beckett's words, when touching upon the question of competitions, were:—"I wonder the leaders of your profession have not agreed by this time to have nothing more to do with them. They tend, perhaps more than any one thing, to degrade architecture by tempting you to work down to the level of the taste of town councillors and committee men, who, you know, are certain to prefer the most showy and very likely the most vulgar and worst design to the best. You know that they are utterly incompetent to translate from paper into stone. . . . To put it simply, I will say that you all know very well that if I asked you for a non-competing design for a building to cost £10,000 or £100,000, you would give me a very different one from that which you would send in for a competition." [SIR GILBERT SCOTT.—"We are obliged."] "Undoubtedly you are, if you compete at all. But there is another reason why I wonder you have not agreed to have no more to do with competitions. All the great ones, for the last twenty years at least, though with a higher class of judges than town councillors, have ended in disappointment, and might as well now not have taken place."

of competitions, as they are generally managed, especially from such a man, who had gone through all stages of the profession, up to the very highest, and had competed in all of them. In my "Book on Building," a few years later, I stated all the objections and exposed the fallacies and tricks of competition, even more fully than Mr. Porter, except indeed one of his objections, which I will notice presently as not a sound one. I remarked, as he does, on the results of the three great national competitions, of which it is enough to say now, that the first gave us a Gothic building by our most eminent Italian architect, the second an Italian building by our greatest Gothic architect, and the third has given us the Law Courts. I agree with all that has been said about the inevitable effects of competitions with no competent judges—competitions which appeal to the taste of persons selected for any reason except their knowledge of architecture, or of municipal bodies such as those who receive obelisks from Egyptian plains, and stick them in a wall on a river bank, and decorate our cities with the monstrous jimcracks of modern town-hall clock-towers. I pointed out also the folly of the sham secrecy of mottoes, and I think it actually better that the design of an eminent man should be openly known to be his. I agree too as to the absurdity of most of the detail drawings that are required in competitions, which never influence either incompetent or competent judges the least; and still more, of specifications, unless they are all required to be read thoroughly by competent judges—which they never are. There is nothing less intelligible to inexperienced people than building specifications. No doubt they are necessary if the real value of the building which the competitor proposes to give for the money is to be estimated; but all that also, as you know very well, is fallacious. Ordinary persons who set up for judges of plans do not even use their eyes so far as to judge of heights and widths and thicknesses of doors, walls, pillars, window-mullions, when they stare them in the face. They think it an unanswerable thing to say, like those masters of irrefragable logic—the female sex—that they "may have what some people think bad taste, but that they know what they want." They don't know what they want. They may know what they like, or dislike, when they see it finished, but they have not the smallest idea of what they will like when it is translated into stone out of drawings, whether dexterously prepared to captivate them, or honestly prepared to show intelligent and experienced judges, but no one else, what the building really will be. But I have said all this at greater length in the book I mentioned, and I need not spend more time now in pointing at the fallacies and tricks of ordinary competitions, which you know perhaps better than I do yet. Anything that you can do towards educating the public out of the folly of that mode of managing the erection of their buildings will be a benefit to them no less than to yourselves. But that is not the question now before you. You are advised by most of these writers and speakers, not to educate the public, but to prohibit architects from competing at all except on terms to be prescribed by you; from doing that by which the greatest architects of this age first rose into fame—not, of course, by those buildings which they were driven into making contrary to their own taste and habits by the ignorance of our rulers, but by other and more real successes. Mr. Porter has himself collected more of them than I was aware of or remembered; to which Barry's early success with the Reform Club ought to be added. Several other gentlemen have given their own experiences to the same effect; and Mr. Christian was so candid as to add that whenever he has failed in a competition he felt that he deserved it. But though I am

no admirer of architectural competitions I cannot agree with imputing to them every symptom of decline in architecture or architects, as these gentlemen have done. It looks for a moment plausible to say that competition has induced the sacrifice of practical considerations to ornament. But the answer is obvious, that that is quite as apparent in the works of non-competing architects as of competing ones, and generally much more apparent in interior work, which is never shown in competition drawings, than in exteriors which are shown. It would be more difficult to refute the common charge that architects are always struggling to spend as much money on ornamentation as their employers can be made to stand, partly from vanity and partly perhaps for other reasons. Once a month I have to sit for some hours in a council room, designed for the Government by a distinguished architect, which he first darkened by costly ground and figured plate-glass windows, rather than let us have such light as might be got from a space bounded by a flat wall certainly, but which might be kept always white for less than the interest of the cost of the decoration, or of the gas lighting alone. For it follows that we are obliged to have the room lighted by gas, except in summer—when we seldom meet. That makes the room intolerable, and yet not the smallest hole for ventilation has been provided; and the ceiling is so gorgeous that no one has yet ventured to propose to cut the requisite holes in it for pipes to carry off the fumes of the gas and of the people. And all through the building we have the same careful sacrifice of practicality to decoration, which nobody there values at three half-pence, as we are only astronomers, whose admiration is more attracted by the heavenly bodies and their laws of motion than by the freaks of modern architecture. So again, to impute to competition the commercial spirit which some of you say is invading your profession more and more, is altogether illogical. Nothing is more common or irrational than this habit of attributing every bad result to some cause which you happen to dislike; and most people use phrases of that kind without reflecting what they mean. The only real distinction between the purely personal professions and the semi-commercial ones is that in the former the man must do all his work himself, or by some friend of the same profession whom his clients or patients will accept; and in the latter he can do practically any quantity by putting on more clerks. Nobody in his senses supposes that an architect with any but the very smallest business does it all himself, and I imagine it is very rare indeed for the greatest to refuse any work that he thinks worth having, as the purely personal professions are obliged to do, or at least to warn those who engage them that they must take their chance, which they often prefer doing. A great surgeon cannot perform more than a certain number of operations in a day, and his patients would decline to be operated on by any "deputy sawbones" he might send. A great advocate cannot be in two places at once, and cannot tell when his cases will come on, and if several clients have determined to run that risk rather than the certainty of losing him, one of them must do without him, and they provide accordingly. Such are the known conditions of the bargain. It is mere absurdity to ignore the fact that all professional men, up to the time when they can afford to do otherwise, or are wanting rest, are in perpetual competition with each other, by whatever means the nature of their professions allows. And the interests of the whole profession, and of the rest of mankind too, are infinitely more advanced by every man showing how well he can do his work than by uttering sentimental platitudes about dignity, brotherhood, *esprit de corps*, sacrifice of individual interests for the good of the profession, and so on,

which Mr. Porter's pages are filled with, and I daresay more will be. But of all the nonsense of the kind that I have read, none is equal to that of calling it degrading, derogatory, vicious, false, selfish, and I don't know how many other dreadful epithets, to exhibit competing drawings if you are not paid something for them, but quite exalted, dignified, virtuous, true, liberal, and worthy of the highest eminence in the profession, to exhibit them if you are paid whatever this Institute may think fit to ordain, and then absurdly call that an *honorarium*, which means that it need not be paid. For that is the real issue to which the question has been gradually narrowed, disregarding the extreme views of a few visionaries who think they can turn back the course of the world, and convince it that all it has been learning for the last century of the benefits of competition, notwithstanding its disadvantages, is to be unlearned. The other points that have been suggested by the various legislators who have been advising you are hardly worth separate notice, and in fact they will all be covered by the remarks I have to make on the general principle of all such attempts to "regulate" this or any other profession, beyond the requirements of general honesty and justice—not the arbitrary justice of regulations—but the general understanding of mankind when not blinded by their own interests. I cannot do better than suppose some such regulations to have been made, and myself to be a young architect determined to show what I can do (however foolishly) in an invited competition which ignores your conditions; and I must suppose that you are doing what I am quite sure you will never dare to do, "convening" me (as we used to say at Cambridge) for defying the College rules. I just remind you *obiter* that, though regulations and codes and instructions are very nice things to cite and to display in support of your own wishes, and many of you are quite ready to do so on occasions, they are regarded very differently when they happen to oppose your wishes. And therefore I am not at all surprized to gather from these letters and speeches that some regulations, which you appear to have actually made about competitions in 1872, have been practically disregarded by every architect who chose with perfect impunity, and so will any others. For this imaginary audacious young man will answer you on this wise when you try him; and I need not say that, unless you are prepared to do so, your regulations at once sink into mere advice, to which I confess I see no objection, except that that is notoriously a medicine of which every patient takes just as much as he thinks good for him and throws the rest out of the window, unless of course he feels that the adviser understands his case much better than he can. He will not feel that here, and will at once bother you by asking what right you have to prohibit him from carrying on his business and making his way as Barry and Scott and a multitude of living men did of the highest standing among you. And so far as I can judge from a cursory perusal of your charter, he will bother you still more by asking what legal right you have to "regulate" his private practice at all, so long as he behaves honestly. The laws of the realm are not to be contravened by any by-laws you may make, even if you could otherwise make any about men's private practice. By the laws of the realm all restraints of trade are unlawful; and in these matters "trade" includes all work done for profit. A, B, C, and any number of men, may agree among themselves, that is, they may promise each other never to make a plan without being paid for it; but I do not know how they are to enforce it if anyone of them changes his mind; and the moment they try to enforce it on anyone who has not agreed—or indeed who has—that is simply trades-unionism, by whatever fine words it may be

disguised. Some of you must remember that that game has been played already. Once an architect was foolish enough to plead another of your codes in a Court of Law as an established custom of your trade, and you remember how it fared. The Barons of the Exchequer, one after another, denounced such a plea as "suicidal, cutting its own throat by its absurdity," and the *Times*, taking up the judicial parable, designated you as a "highly respectable trades-union" in that respect. He will ask if you are disposed to face that treatment again by daring to expel him for exercising his legal rights in spite of your new by-laws. If you tell him he is honourably bound, if not legally, to obey the decree or the opinion of the majority of this body of Fellows, he will simply answer that he is as good a judge of that as you are, and that he does not agree with you; and further, that no man can be bound by any resolution which the makers, however numerous, had no authority to make. If you condescend to argue with him and show him Mr. Porter's interesting calculation that the competition drawings of any year cost the profession £25,000, which is all wasted according to some of these writers, he will derisively reply that he does not think his time will be wasted, as he hopes to win, and has plenty of time on his hands, and that nothing is farther from his wish than that anybody else should waste time which they value so much in competing with him; he would much rather they did not. At any rate he may win if he competes, and being an unknown man he certainly will not be employed if he does not. He may ask if Mr. Porter has calculated the annual expenditure of other people seeking for custom or employment in advertizements, which is their way of exhibiting. You architects are very fond of calling yourselves "artists" (I, speaking for myself now, have no idea why; for, I should have thought that men who design or direct other people's execution stood higher and not lower than those who execute their own or your designs; and they are artists, and take care to call themselves so—not merely painters and sculptors, but your own carvers, as well as singers, dancers, hair-dressers, dressmakers and cooks). The young architect will ask what you think the highest artists send their works to the Royal Academy Exhibition for; nay, why you send your own designs there. You are not paid for that. And he will repeat the other arguments which I have used already. If you have nothing better to reply with than a quantity of such phrases as I have been reading from these papers, all I can say is that the offender will have very much the best of it, and you will wish you had let him alone. Even if all this were wrong, or if by some oversight of the proper authorities you got a charter authorizing you to interfere with the professional practice of your Fellows (I repeat, so long as it is honest), the only consequence would be that men would ask whether the magic letters F.R.I.B.A. are worth the cost of forfeiting their natural rights. I cannot conceive any man of sense and spirit, with any real capacity for getting on, hesitating for a minute a letter over that question. So much for him. Now for the public bodies who are determined to have competitions, whether they are wise or foolish. It is hardly worth while to discuss whether you can drive them out of it by trying to prevent your members from competing except on your terms, because I have already shown that you cannot; and that at the most you could only deprive yourselves of every man who chooses to compete. The idea of your making rules, too, to restrain not the small but the great members of your profession from doing as they like, is too absurd to discuss; and yet it is by keeping the great ones out of competitions that Mr. Porter and his allies fancy that they are going to control the public, and at the very same time they all admit

that great architects may fairly enter the great competitions if they like. Small ones I should think they seldom do, and therefore as to them no interference of yours would make any difference. You may say, however, that these arguments of mine cover a good deal more than any new or old regulations about competition by exhibiting designs; that I should leave you all at liberty to compete in pecuniary terms also, which would be intolerable. I never shrink from logical consequences, and I agree that that conclusion does follow. It is a large question to introduce at the end of one of a multitude of speeches, and therefore I will only say a few necessary words on it. I deny first that such a result would do any harm. I have always denied it, and have said for years, both to great men and to small ones among you, that I never could see any reason why Sir Gilbert Scott, for instance, should be expected to make designs for the same price as men whose work cannot possibly be of the same value, and very often is of less than you would get from a builder of experience for nothing, if he was employed to do the work; or on the other hand, why smaller men should not offer to work for smaller charges if they like, as they do in all other professions, and eminently so in the artistic professions. As epithets cost nothing it is very easy to try to dispose of this by calling it "commercial," and "lowering your profession to a trade." It happens to be just the contrary. For the great distinction between trades and the personal or entirely uncommercial professions, is that trade prices do not depend upon personal qualifications, but the fees or charges of professions do, except where they are limited for public protection by law, as solicitors' charges are. Barristers indeed have a minimum, but it is so small that it does not practically affect this question; and so have physicians. But we can neither of us recover it by law; and wherever physicians of no great eminence wish to compete with what are called "general practitioners," who send in bills for physic and attendance, they do so by only taking the established guinea at every third or fourth visit. But I am not discussing what it may be wise or proper for any architects, great or small, to charge, but whether this Society alone of all in England has any right, legal, moral or conventional, to dictate to anyone what he is to charge, either for competing or for non-competing plans. And I say distinctly, and defy anyone to refute it, that any attempt to do so is pure and simple trades-unionism, and any attempt to enforce it would be just as bad as Sheffield "rattening." Quite by accident the other day I came across this respecting Adam Smith, the founder of political economy. Dugald Stewart, the celebrated professor of Moral Philosophy at Edinburgh, wrote of him thus:—"Smith's great object was to demonstrate that the most effectual plan for advancing a people to greatness is to maintain that order of things which nature has pointed out: by allowing every man, so long as he observes the rules of justice" (not the arbitrary rules of an association) "to pursue his own interest in his own way, and to bring his industry and his capital into the freest competition with those of his fellow citizens." From the time when Adam Smith published that doctrine, just a century ago, it has been more and more recognized by every political economist, and I may say by every man of common sense when he has been unbiassed by his own interest or by antiquated prejudices; or I must add, by sentimental notions of regenerating mankind by some process contrary to the laws of nature, if it is worth while to allude to the vagaries of a defunct modern sect called "the Christian Socialists," or the still greater vagaries of a celebrated man whose writing on such subjects always reminds me of some beautifully sounding "nonsense verses," which were said to have

been composed in a lunatic asylum. His last discovery is that all payment of interest for the use of money (and therefore of everything that costs money) is usury, and sinful; and competition is his special abomination and the cause of most of our evils. About the time when Adam Smith began to open the eyes of mankind to all that folly, the greatest and most beneficial inventor of the age, James Watt, was kept from making steam engines in Glasgow by the old Guild laws, which I have heard some of the aforesaid sect vindicate, but which are gone for ever. Mr. Gladstone is quoted for having called all restrictions of that kind "mere robbing and plundering of ourselves"; and so they are, as their object is always to prevent the public on one side and the person who offers something better or cheaper on the other, from accommodating each other. Probably few of you know that the latest legislation on the powers of a professional corporation, namely, the Medical Council of England, absolutely prohibits them from imposing any restrictions on professional practice, and even prohibits the Crown from giving any such power *per incuriam* in a new charter to any medical college. And you need not imagine that any object of that kind can be indirectly effected by requiring understandings, declarations or expressions of opinion on pretence of examination for admission: all such attempts would be absolutely illegal and good for nothing. I confess I have read the report of your last Meeting with astonishment, that not one single writer or speaker should have perceived that even discussing such a question as that of this corporation interfering with professional practice is a reversion to ideas altogether exploded, and abandoned by every man above the education of a trades-unionist; that you should have so soon forgotten the reception that another of your codes met with in Westminster Hall and from the press, which I have already mentioned; and that you would be entering on a course of action which you would not dare to follow up to its legitimate conclusion of expelling those who defy you, so long as they violate no other law but yours. I daresay a good deal of what I have said will not have been altogether palatable; but that is a dose which lawyers and doctors often have to administer if they are to do any good to those who call them in. This is eminently a case where "observers can see more of the game than the players," as is proved by no speaker having yet taken this view of it. And I am sure that these observations had better be reflected on (and in one sense I have no doubt they will be) before you commit yourselves to the suicidal enterprize of doing anything like what has been proposed by most of these writers and speakers. On the contrary I advise you to burn every code or document that you already have which affects to interfere in any way with the right of every professional man to carry on his business according to the laws of the realm, as your charter says, and of honesty and justice, as Adam Smith said. For though your Council, I know, do not profess to consider any such code binding, I also know that it is constantly used by architects as if they thought it so—or at least wish it to be thought so.

PROFESSOR KERR, *Fellow*.—I have to ask your forbearance, having uttered a few unprepared words on the former occasion, if I rise again. I must say that I am grieved and disappointed to hear the remarks made by Sir Edmund Beckett. I am quite sure that if Sir Edmund were to be kind enough to take the other side of the argument he would make a very much better conclusion. He leaves us in a condition of absolute despair, he gives us no advice except to do nothing, he offers us no hope except absolute hopelessness. Now I am not going to answer Sir Edmund, and I do not advise anybody else to do so. But, Sir, I have ventured

to put in writing some thoughts which I ask permission to read as my deliberate opinion upon this subject. Thus:—

The only conclusion I can arrive at with any regard for common sense is that the system of architectural competition is radically unsound in principle, and in practice most prejudicial to the profession of architects both financially and morally. Whether it benefits the public in any way may be for a moment a question; but even on this point I believe the answer must eventually be in the negative. The nearest approximation to competition, which I am able from experience to approve, is that the client who desires to have the benefit of a selection of designs shall obtain designs from as many architects as he pleases, pay for them all, and choose for himself. This plan is not an untried one. When I was a pupil, in a shrewd commercial city of the North, this was the only plan known to us, and it answered admirably. I have always advocated it; and when adopted, I have never known it fail, except in the precise degree in which its principle was compromised. I regard it as the only form of competition (if you prefer to call it by that name) which is commercially defensible, or in honour satisfactory to those concerned on either side. It corresponds, moreover, precisely with the custom of other professions. The client who consults several lawyers pays them all, and follows the advice which seems the best. He who consults several doctors does the same. Several other analogies might be quoted. It is only with tradespeople that the custom is different. The buyer who asks for samples of goods to be supplied to him, or occupies the time of the seller in explanation and negotiation, may in the end decline to buy, without offering to pay for the trouble he has given. But even here the samples that are supplied will be of no substantial value, and the time that is wasted is equally of no account. But I know of no other instance in professional business in which anything really akin to architectural competition has ever been recognized—except of course in those cases in which other artistic practitioners have been induced (very seldom) to follow the example of architects, when they have always regretted it. I speak as having been myself a successful competitor. Commencing at the age of two and twenty, in no less remote a place than New York, where I gained my first premium, I find that I have engaged in about twelve competitions, never competing at random and frequently trying what I could do, as if for the honour of the cause, in the most important contests. I have gained four first prizes, one second, and two otherwise highly satisfactory positions; once I was paid in full with all the others, and four times I have been wholly unsuccessful. I mention this with a certain hesitation, for the sake of saying emphatically that, in spite of all, I have never got any real good by competition. I may also remark that in one of my most satisfactory works—a public building—I obtained the preference in spite of competition, and by the very means of refusing to compete, that is to say, I first submitted a sketch design which was set aside for a competition. I refused to compete, the competition (a limited one) took place, the premiums were paid, and my design was then sent for and adopted. I never saw any of the competition designs; but I mention this instance because I have always held it to be evidence of the futility of competition when fairly contrasted in effect with the selection of an architect in the usual way, and the communication to him, in their full completeness, of those private explanations of the requirements which competitors can never by any possibility so thoroughly obtain.

I have never known any man succeed in establishing by competition any reputation which he would not have better acquired without it—except occasionally a bad reputation, which, but for competition, he might fortunately have been able to escape. I know of no other kind of temptation in business so subtle as that which assails, as I think, a high-minded man when involved in architectural competition, and especially if he is to be successful. I know of men who have succeeded by competition in attaining to the promise of a position which they were not qualified to hold; but they have never been able to retain it, and have in several cases been ruined in their legitimate prospects by the consequences of such hasty and fallacious good fortune. I do not hesitate to say that competition success leads generally to personal and public disrespect; and this not through jealousy alone, or personal offence, but by reason of the ordinary estimate of the qualities by which alone such success can be obtained. I will add that the effect of competition is never to encourage the generous sympathies of competitors, but always to provoke envy, false hope and self-conceit insufferable. There seems to be more heartburning caused by competition than by all other forms of antagonism that prevail amongst us. We are at this moment the only profession which to all intents and purposes exists without an etiquette; in this most vital respect we are no better than the commonest of trades. I do not see how any principles of professional discipline can ever be recognized so long as we adhere to the practice of a kind of rivalry which is so essentially unprofessional and so entirely tradesmanlike in its character.

The only inducement that I can see for the maintenance of the competition system lies in the supposition that modest merit can thus obtain its reward. This I hold to be an utter fallacy. Modesty will wait; it is immodesty that will not. Merit can wait; it is demerit that cannot. The man who in professional life is the most fortunate is he who starts without false aids, without fallacious incentives, without self-conceit and without hurry. Waiting patiently, working diligently and walking uprightly, until he has reached the age of matured usefulness, he then attains that position which matured usefulness alone can permanently hold, because it alone is worthy to hold it. In plain language, at the age of forty (which is recognized as the earliest period at which a man may expect to acquire a position in a profession as distinguished from a trade) he finds himself beginning to know the world well; youth has passed into full manhood, and he has five and twenty years before him during which to employ his energies at their best, and to win respect for a meritorious old age. What does such a man want with competitions? What can he gain by them?

But I am sorry to say, as the result of a long and intimate acquaintance with the profession of architects in all its departments, that there prevails amongst the young men, even the youngest men, an undisciplined restlessness and a fatal feeling of rivalry with their seniors, in one word an absurd impatience of mere self conceit, which exists nowhere else within my observation—at least in what may be called business as a different thing from those more transcendental pursuits of poetic fancy where the wildest assurance is perforce excusable, ludicrous however as it is generally discovered sooner or later to be. I attribute this circumstance, speaking advisedly, chiefly to the public recognition of the idea, with respect to architecture as distinguished from everything else, that meritorious adolescence may attain instant ascendancy by the happy institution of competition. What is the natural consequence of such perverted doctrine? I dare to say there is not one amongst the very foremost architects in England who

has not at this moment in his office a lad or two who would be perfectly prepared at any moment to try, with the most brilliant confidence, conclusions with the master and all his peers in the field of open competition! Surely this is a most outrageous misconception of intellectual principle; and what can we reasonably expect to come of it?

Can there be any doubt what the opinion of the outside public is about our competitions? Is it anything else than a feeling of astonishment that we should be so foolish? Depend upon it, the more closely we look at the practice, the more foolish it must seem. It has no more substance in it than the will-o'-the-wisp, the delusive phosphorescence of mere pestilent vapours; and I hope we are not now to be induced by specious sophisms to confirm and renew our reliance upon it. I have been hoping of late years that it was being permanently distrusted.

I am prepared to say, lastly, that this Institute ought to discourage, and even to denounce, all forms of competition except those in which each competitor shall be fairly paid for his work. This alone is respectable and honest, professionally dignified, commercially rational and consequently satisfying all round. Disappointments there must be, but reason for dismay there need not be. The history of our architectural competitions is a history not of disappointment, but of despair. The only agency in which I have any faith for the correction of the evil is this Institute. No special association of competitors can work with any effect; but this Guild has a practical authority over the profession at large, and a practical influence with the public, which are all powerful for any good end if exercised with decision, and of course with wisdom. When we hear, as we have recently done, of a member of our Body who was commonly held to be the one most especial favourite of Fortune, having been so disturbed by continual dissatisfaction—chiefly arising out of success in competitions—as to threaten in the very hey-day of his success to throw up the profession altogether as a hopeless failure, it is time that we began to reflect seriously upon the position which we occupy. It is a position, I believe, possessing many advantages to ourselves individually, both intellectual and social; the peculiar delights of an architect in his work, and the peculiar respect he meets with from his clients, despite the usual trials and troubles of business, are considerations refined and gratifying in a most unusual degree. But I cannot help saying we are falling in general estimation rather than rising; and I am of opinion, with all submission, that the best way out of such a condition of things is the boldest to establish in the profession, under the authority of this important and in itself as yet honourable Guild, some system of generous etiquette, at the very root of which there must inevitably lie a determination to avoid a demoralizing form of rivalry which separates us from all gentlemanly professions, and associates us with the most vulgar ideas of the shopkeeper class.

HENRY DAWSON, *Fellow*.—I have taken some little trouble in thinking over Mr. Porter's Paper, and I have listened with great attention to Sir Edmund Beckett and Professor Kerr. I do not know that I can say I am sorry for the remarks of Sir Edmund Beckett on the subject. He, of course, has his own views and I am very pleased at the humorous way in which he has expressed them, but I feel compelled to disagree with a good deal that he has suggested to us. I must confess to a similar feeling with regard to much that Professor Kerr has said. Following the lines of Mr. Porter to some extent, the Professor asks that we shall do all we can to discourage competition. Now I admit that there is very great force in his remarks respecting

the singularity of our profession as compared with the Bar and Medicine, where it is the custom, when a number of professional men are employed in one case, to pay each man for the services he renders; and to some extent there is a choice on the part of the persons employing them to select the best. In that respect we appear to be in a somewhat anomalous position; but inasmuch as there is in our case a difficulty in offering or commencing our work except by the preliminary process of drawings, which we have first to prepare in order to show the public what we propose to do, I cannot see a way out of it, and there must frequently be a competition of some kind or other prior to our employment. I think the great question is first: Is competition desirable, and therefore profitable, either to the profession or the public? The answer to this must in the first instance depend upon the nature of the cases. If the cases are those of works of which the extent and importance are not sufficiently great, then I doubt if competition is of any advantage either to the profession or the public, but where the works are of large extent or of great importance, then I think that competition is a very healthy medium of acquiring the best works; but I do not think it is so much so to the public as to the profession. I think that the public in ordinary cases are much better served either by limited competition, or by the selection of a single architect of known talent and experience, where personal intercourse and confidence will be sure to induce heartiness and success. To say, however, that young men are quietly to wait until the public come to them and employ them to undertake a work is really asking them a great deal too much. It is an unreasonable postponement of their chances. Nor do I think it any more reasonable to expect that all the Fellows, those whom Mr. Porter calls the elders of the profession, but many of whom are not so, should refrain from all open competitions as he would desire. I think the whole question resolves itself into this: How shall competitions be best carried out? On this point I am of opinion that the regulations of 1872 as framed and passed by our Institute, although I consider them to need some amendment, do in the main clearly show the honourable conditions upon which competitions may be and ought to be conducted. And here is the point where I entirely disagree with Sir Edmund Beckett in saying that every member of our profession may do as he pleases and work as he chooses under any conditions whatever, even when he belongs to an incorporated body such as ours. I should certainly think it a most scandalous thing if a member of our Institute should hold himself at liberty to transgress its rules or even its honourable customs as he pleases. Again, to say that we are not to have any rules or regulations in such important matters is to plunge us into that condition of hopelessness to which Professor Kerr referred. We are asked by Sir Edmund Beckett to educate the public, and that is what we have been long trying to do, but evidently with very little result. I do not see how we are to make any effectual impression upon them except by making rules amongst ourselves that we will refrain from taking part in any work except upon certain general conditions to be binding upon us as men of honour and education. I think it would be very unreasonable and unfair to the younger members of the profession to deprive them of sufficient opportunities to compete. At the same time I do ask the younger members whether they very often do not waste much time and money in being in too great a hurry to go into competition. If they would be a little more patient and learn a little more before they venture in the race, they would be better able to produce good designs and make a better start for themselves. As to the amendments which are needed in the Institute regulations for the

conduct of competitions, I will not detain you now by going over them, but there is one important feature in them which should be strictly insisted upon, namely, that there should be in all open competitions one or more professional assessors. Until that is done I really do not see any hope of ever making competitions do what they are intended to do, and in general I should prefer that there should be more than one assessor; and if there is only one, he should not be a pronounced member of any particular school, as that would not be fair to the competitors. But all these points will right themselves if only we are in earnest and united. It was put forth by the author of the Paper that if Fellows would refrain altogether from open competitions the Associates would follow suit. I thoroughly doubt it, and I think it would be a most unreasonable thing that they should be asked to follow such a course, for it would surely be too violent a strain altogether upon our *esprit de corps*. That the older Fellows should agree to refrain as much as possible from the smaller competitions would I think be fair and dignified. But take the case of some of the younger Fellows who cannot command a continuity of good practice. Is it proposed that when such a man has his assistants in his office almost idle, with the T squares on the pegs and the drawing boards down on their edges, he is to abstain from any open competition if the conditions are honourable? The great evil which to my mind calls for reprobation has been that whereas we have made rules and regulations—those I referred to in 1872—there are frequently to be found Fellows of the Institute who seem utterly to disregard them, and will go into the first competition of any sufficient size in which they think there is a chance of their succeeding. So long as that is the case it is perfectly useless to make any regulations at all. It should be with us as with other professions. The regulations should be clearly understood and approved, and then they should be loyally and honourably adhered to. Sir Edmund Beckett was doubtless right in his observations upon the complaints about the waste of capital and time in competitions. It is quite true that many a young man goes into them for the sake of making himself known, and I submit that it is a very fair and legitimate way too, provided he only bears in mind the honourable conditions by which he should be bound. I will just allude to one recent instance in my own experience. It was a competition for a city building of importance; many will probably know the one I refer to. I thought the conditions were not in accordance with the rules of our Institute, and I asked whether they could be modified in any reasonable way. I considered that many of the conditions were most unreasonable, for instance, requiring an excessive number of drawings, and to an eighth scale, a full and complete specification to contain full descriptions as to warming, ventilation and other details, and an estimate of cost to include all works for the entire completion of the building. Moreover there was no assessor to be consulted and there was no reasonable guarantee of employment. I particularly inquired on these points, and I was told that they could not be modified; so I said that I must decline to compete. I hoped that a good many others would decline, but I was sorry to see, when the drawings were exhibited, the names of several Fellows whom I could hardly have thought would have been induced to swallow the pill. So long as this is the case I think we cannot hope to make much progress with the public. How, I ask, can we claim dignity and honour for our profession if we are not true and loyal among ourselves as a guild of cultivated gentlemen?

T. CHATFIELD CLARKE, *Fellow*.—I am sure we are all deeply indebted to Sir Edmund Beckett, but I must confess that his speech has left upon me very unpleasant impressions.

I cannot imagine that it can be wise counsel to young men who are beginning life, and I should say that, having from a young man worked my way up to the present day, if I had pursued that course, I do not think I should have been addressing this audience to-night. Sir Edmund Beckett forgets that in most professions there is a certain minimum recognized fee. I always find it in my solicitor's bill. I know it exists in my doctor's bill, and I know it exists in many other relations of life, and therefore I say it is not wise, nor is it desirable when you know that the recognized fees of our profession are very moderate, and not more than sufficient to enable a man to live respectably and to raise a fair competency, to advise young men that they may depart from such recognized scale. I think, I say, it is very unwise to tempt young men, by any words or experience a man may have himself acquired, to work at any rate and at any fee which must ultimately lead them and tempt them to do that which is not right. I therefore would earnestly counsel young men not to follow any advice to depart from the acknowledged charges, for if they do so they will be led astray. I feel sure Sir Edmund Beckett disclaims any such idea, but such I believe to be the logical result of his argument. With regard to the question before us I have had something to do with competition, and I know, as well as many men, its great trials, its great disappointments and its great defects. Now I say practically it is no use our discussing here to-night doing away with competition. Competition in one way or another I am afraid will go on however much we may dislike it. I share the dislike expressed for it by Professor Kerr and by others, but what I think we ought to do is to try and regulate fairly the conditions of competition as a practical question. I approach the subject from a somewhat different point of view from what I have heard other gentlemen do. I complain mostly of the unfairness of the committees before whom our plans are submitted. I could give you an experience of my own which in one word would convey to you the mode in which I was prepared to deal with a committee who dealt with me unjustly. I obtained a competition of some considerable size and I was "done" out of the execution of it. What did I do? I consulted my solicitor, who said I was entitled to the whole of the commission upon the advertized amount, and I obtained half of that. I considered, my solicitor considered, and the committee considered, that, in making my claim £200 instead of £400, they were let off very easily indeed. I would advise men who enter into competitions to look well into the conditions of those competitions, and to bring committees to book, to bring to bear a considerable amount of energy upon committees in order to make them suffer when they deal unjustly with you. That is one of the practical points about which I rise to speak to-night. I could tell you of other instances where the same thing has more or less arisen. But it has to be met and it ought to be met in this way because this is a common way in which we are treated. It is constantly our experience to find that a man's designs are selected and that the estimate given in them may much exceed the amount which was specified in the conditions. I do not know what the law of the case is, but I think the point ought to be tried and that at no distant date: whether committees are justified in advertizing conditions, and then gentlemen having honourably made their plans in accordance with those conditions, and having kept within the price, whether such committees are justified in giving the work to a man whose builder's tender ultimately much exceeds the conditions of the competition. I should like to see the question fairly tried, because you know that is an injustice from which we suffer, from month to month and from year to year. Many an

architect enters with perfect fairness into a competition; he commences with the feeling that he will not let his motto be known. But I appeal to the experience of many men whether they have not been asked by members of the deciding body what their mottoes were, in order to elicit information, and act in a way which is not highly straightforward. It is from the side of the unfairness of public bodies with regard to their action upon architectural competition that I wished to address a few words to-night. With regard to the general conditions of competitions we must recognize that the appointment of an assessor is one of the rules of the Institute conditions of competition. But now here I will give you a case in point. I was once asked to join in a limited competition with five or six other men for some co-operative stores—I forget the particular one—and I at once wrote back and said that the rules of the Institute suggested that there should be an assessor, and it was my duty to lay that before the Secretary of our Body, and to ask them to assent to that. I never heard any more of that competition. I do not very much regret it, but to this hour I do not know who did the work. It was sufficient that I put before them the rules of the Institute, and I dare say that is the experience of other men. But there are one or two other points upon which we ought to lay stress. One is the question of mottoes, and I look upon mottoes as a sham. I think it would be far better in all competitions if men had their drawings openly signed. I do not at all agree with the perpetuation of mottoes which are known and are felt to be an utter sham. With regard to the question of an honorarium we ought, no doubt, generally to stipulate where we can that a moderate honorarium be paid for each set of drawings, in order to cover a certain portion of the first cost. With an honourable body of competitors, an honourable body of judges, an assessor, and no sham mottoes, with a slight honorarium, I do not see why young men should not have the chance of coming forward, particularly in limited competition; and I say it is far more practical, Mr. President, for us to-night to be considering the honourable conditions of limited competition, than it is to attempt to argue upon doing away with competition altogether, which I believe to be thoroughly impracticable. One word I will say in conclusion on the whole matter, which I have often said to public bodies, to my clients and others, when they have talked to me about competition—I say you do not compete for your lawyer or your doctor, or for your accountant. You go to the man in whom you trust, and whom you choose, who you think has a head on his shoulders. Now I claim to be treated in the same way.

C. F. HAYWARD, F.S.A., *Fellow*.—I would remind the meeting that what we are discussing in Mr. Porter's Paper is that some practical steps should be taken to minimize the evils arising from the competition system as at present practised; and I think it is a little beside the mark to discuss the question whether there should or should not be competition at all. I quite agree with Mr. Clarke and others that we cannot possibly do away with competition if we would wish; I even allow that there are many benefits arising from competition. The benefits to myself have not been from the prizes, but from the practice of going into competitions to a small extent at an early period of my career. I never won but one or two competitions because I suppose I never had much heart to go into speculative work, and the one I did win was unsatisfactory from the very causes Mr. Clarke has enumerated. The work—which was not carried out by me—has cost more than double the amount which I was required to work up to by the conditions of the competition, and to which I was careful to

limit it myself in my design. I therefore feel that the cost, having been stated in the conditions, should be more or less adhered to, but it seems often to be altogether ignored. The practical point this evening, however, I take to be, and the whole object of this Paper is, whether we shall or shall not have any sort of accepted rule or regulation by which the evils that we all acknowledge can be minimized. It seems to me very futile that we should have been here two evenings discussing this subject, and then let it drop without any action at all. I am old enough to have heard a great many discussions about competitions, and one of our oldest printed papers is upon competition. I cannot see any reason why, if there is any *esprit de corps* among architects, we should not engage ourselves not to compete unless certain regulations are complied with. I am glad to say that I have not the smallest confidence in what Sir Edmund Beckett said with regard to the profession generally. I do not believe that one young fellow out of a dozen would willingly break such a rule if he himself saw it was for the benefit of the profession at large. I do not want to over-regulate the younger men of the profession, for there may be no harm at least in the younger associates competing as they please; but the regulation that seems to me to be most needed is one referring to the cost of the works. With regard to other regulations suggested by Mr. Porter I need not refer to them in detail, as you have all read them. Some of them seem to me really worthy of adoption, and all of consideration, so I only hope that the Council will deliberate upon them, and bring to some practical conclusion this valuable and interesting Discussion.

THOMAS PORTER, *Fellow*.—I need only make a few remarks regarding the views expressed by those gentlemen who have taken part in the Discussion, and whose opinions, however various, are entitled to the highest consideration and respect. Professor Kerr, in opening the Discussion, maintained that the cost of competition drawings had been exaggerated. If the Professor meant to convey that such had often been the case, I most fully concur in his view; but if he meant to suggest that the cost mentioned in my estimate has been over-stated, I think I can satisfy him that such was not the case. As you know, it was generally reported that the cost of the drawings of the Government Offices Competition was as much as £50,000, but in my estimate I have put it down at only £3,488—that is, 218 sets at eight drawings to each set, and £2 for each drawing. Taking therefore the particular set to which the Professor alluded, they were estimated by me at £16. The Professor admitted to having spent £15, and to having done nearly all the work with his own hands, so that his estimate and mine only differ by £1. All who have been successful in competition have no doubt done a large part of the work themselves, and hence their success; but the average cost of £2 a drawing as actual out-of-pocket expenses is not an excessive statement, and if value of time is to be taken into any consideration it would be far below the average value of a competition drawing. Mr. Fowler suggested that young men entered into competition for the pure love of the thing. Few I think will doubt this, and the fascination that seems to exist in the human mind for anything connected with chance may be the reason why after repeated failures men go on again and again trying to win, forgetful that in the competition game there are few prizes and many blanks. I feel grateful to Mr. Barry for reminding you that the object of my Paper was to show the effects of the competition system upon the profession as a whole, and not in relation to its results to a few favoured individuals; unless it is looked at in the broader sense, the

statistics will fail to make any impression or conduce in any way to remedy the evil. I should never have thought of discussing the subject of Architectural Competitions unless I had entertained a hope that the Institute would take some practical steps to remedy the evils that are, I may say, almost unanimously acknowledged to exist, even by those who are advocates of competition; and I venture to believe that it would not be impossible to frame about a dozen healthy laws that should not only meet with the approval of a large majority of the members of the profession, but also be accepted and endorsed by them.

The PRESIDENT.—Mr. Porter has done what is perfectly legitimate; he has called attention by his remarks and statistics to the evils of competition as at present conducted. But on ordinary occasions like this it would not be right to move a resolution affecting the action of the Institute. Before closing the debate I would ask you to be good enough to express your thanks to Mr. Porter for the Paper he has read, and I must also ask you to include a vote of thanks to our esteemed Honorary Associate, Sir Edmund Beckett, whose remarks, though they may not have been absolutely palatable to every individual in the room, will certainly be very useful to us in any discussion of this subject that we may have hereafter. Indeed, it must be in the memory of most of you that this is not a new subject; it has been from time to time occupying our attention during the best part of our lives.



* * * The Secretaries have received from Wyatt Papworth, *Fellow*, the following note :—

During this Discussion, on the 26th January, Mr. Christian referred to the introduction of "sketch plans, some two or three years ago, which were considered a novelty in the way of competition; it was not an original idea of mine but suggested by Mr. Clutton." Mr. R. E. Pownall also referred to "an open sketch competition" in three other later cases. I would mention on this point that so long since as February, 1856, a competition was advertized for the Free Public Library and Museum at Liverpool. On receipt of the usual instructions I wrote to Mr. Picton, an architect of Liverpool, who was connected with the committee, suggesting "a first competition of sketch designs." This was at once adopted; the plans were arranged to be in pencil or ink, slightly tinted, with a front elevation or a perspective view if preferred: twenty or not less than twelve designs would be selected from those submitted. Out of 115 such designs sent in, only sixteen were considered eligible. These were stamped with the Corporation seal, returned to the competitors, and sent back with the complete drawings made by the selected architects so as to verify that each had kept to his preliminary design. Two designs were then chosen for the premiums originally proposed. The amount of waste labour saved by this process must have been very large.

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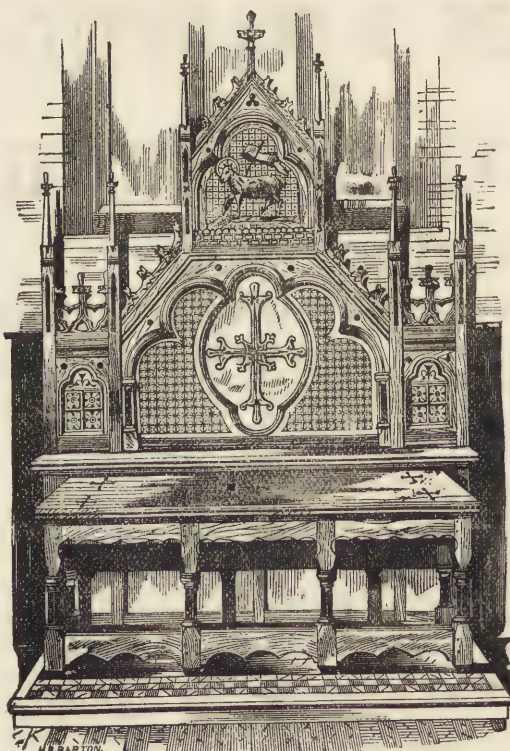
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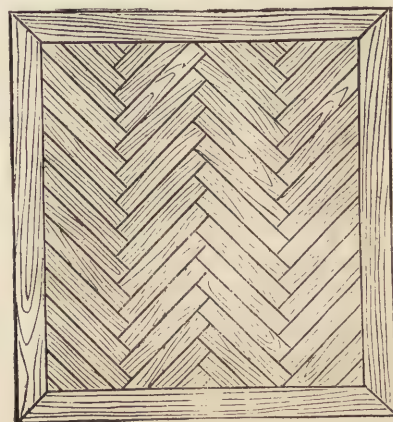
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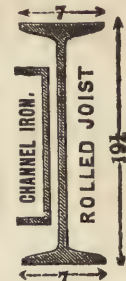
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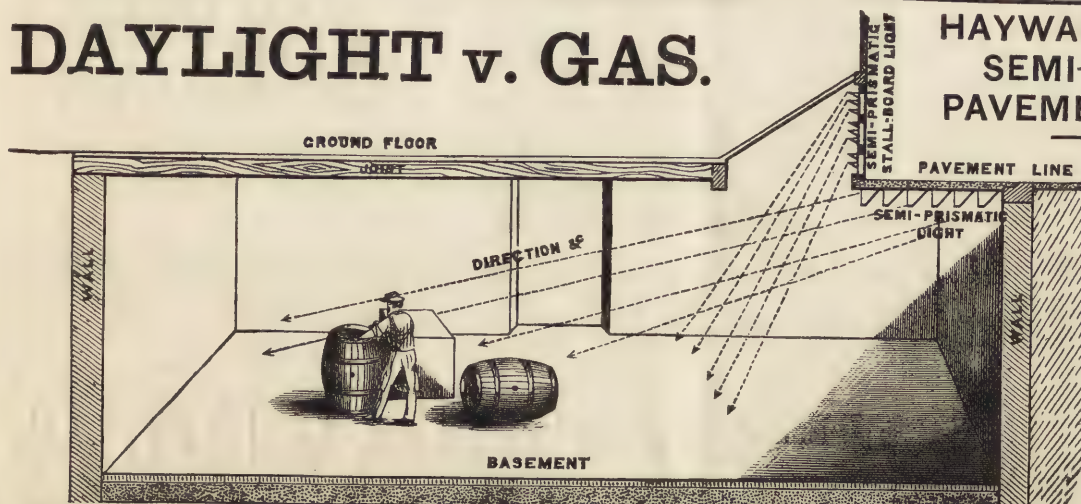
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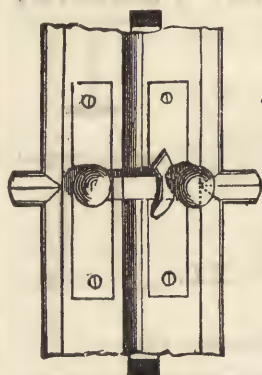
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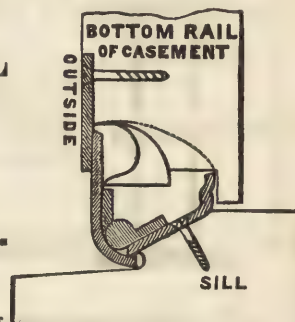
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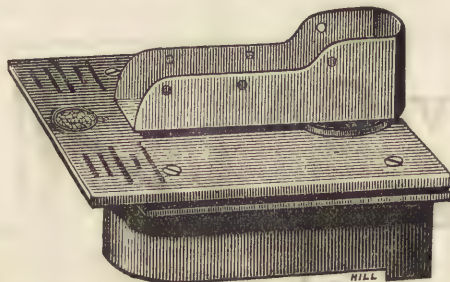
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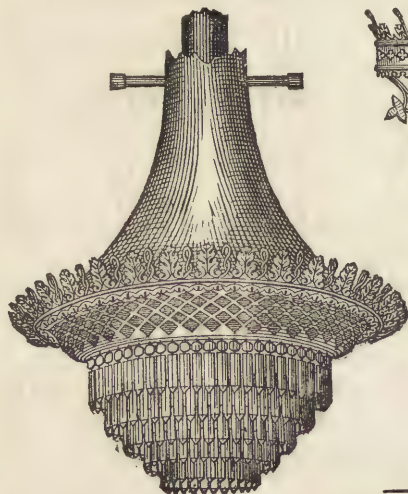
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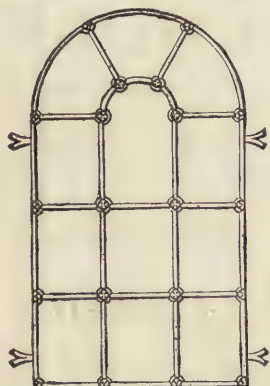
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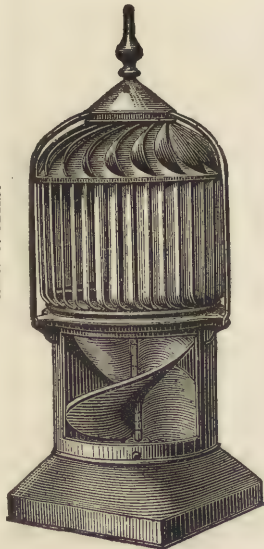
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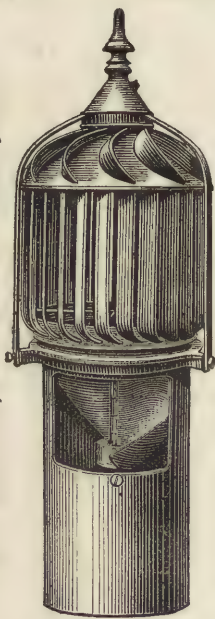
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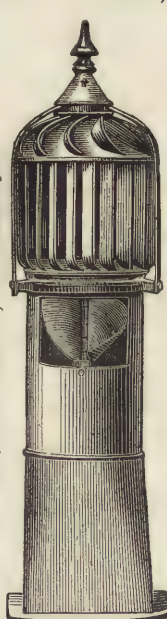
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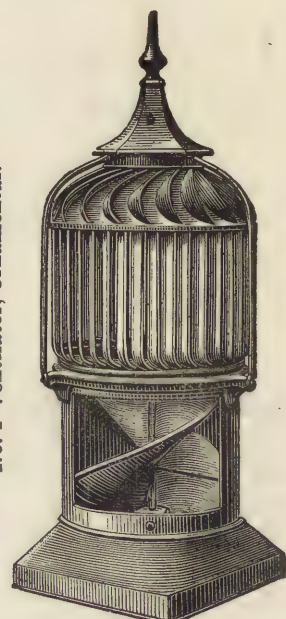
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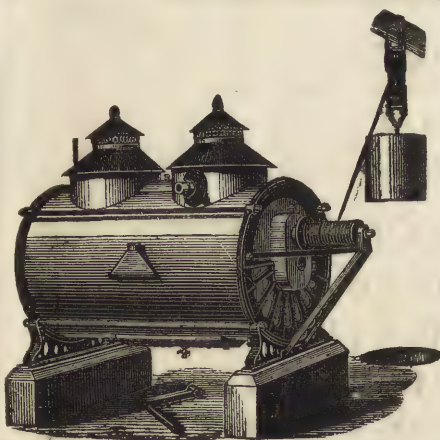
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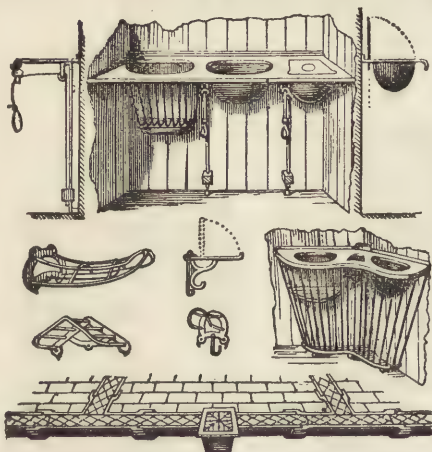
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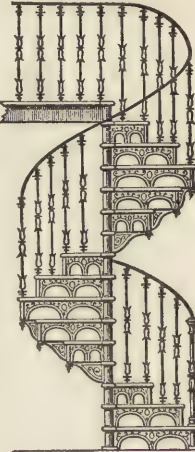
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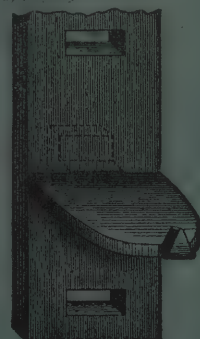
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No. 6.

TITLE OF PAPER.	AUTHOR'S NAME.	
I. Opening Address	John Whichcord, F.S.A., <i>President</i>	Dec. 1st, 1879
II. Frederick Pepys Cockerell: a Memorial Sketch	.....	Dec. 15th.
III. Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S.	Jan. 12th, 1880
IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.
§ Adjourned Discussion on ditto	Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> , Professor Kerr, <i>Fellow</i> , and others.	Feb. 9th.
V. Portland Cement	Henry Faija, Assoc. M.Inst. C.E.,	Feb. 23rd.

SESSIONAL MEETINGS: MONDAY EVENINGS.

1880 MARCH	8†	1880 MAY	3†—24
APRIL	5 —19	JUNE	7§

† Special Meeting. ‡ Annual Meeting.

§ Presentation of Royal Gold Medal.

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* The figures refer to Descriptive Pamphlet, forwarded, with List of Safe Doors, & c. for Strong Rooms, & c.



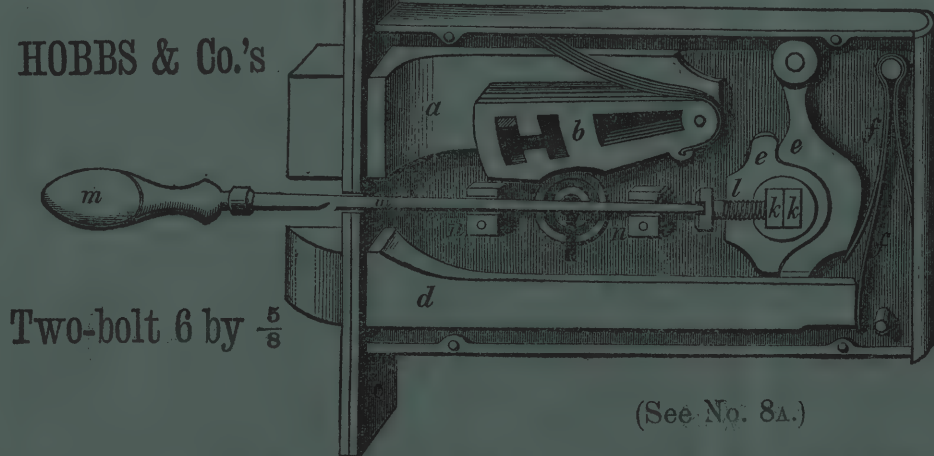
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V. PORTLAND CEMENT. BY HENRY FAIJA, Assoc.M.Inst.C.E.

I BELIEVE it is some forty years since Professor Donaldson made some very interesting and exhaustive experiments with Roman cement, and with the septaria from which that cement is made. Roman cement was then employed in almost every building of importance, while what is now known as Portland cement had scarcely emerged from the laboratory and was practically unknown. The introduction of this then new cement, it is needless to say, was met on all sides with great opposition, but its eminently hydraulic properties and great strength eventually asserted themselves, until at the present time Portland cement is synonymous with strength. But like all manufactures which assume large proportions there are unfortunately both good and inferior cements to be met with; and as the strength of a concrete or mortar must depend not only on the quality and properties, size and shape of its aggregates, and the means employed for their amalgamation, but also on the strength and quality of the cement, I propose in this Paper to speak solely of the primary source of strength, namely, the cement.

The recognized tests for Portland Cement are its weight per striked bushel, the fineness to which it is ground, its colour and its tensile strength. With the exception of the tensile strength, which is an absolute test, these tests are really only problematical, for it is evidently possible to obtain a material that, in weight, colour and fineness, may approximate to the standard required in Portland cement, and yet not be cement. Hence a bad or a damaged cement may possess all these requisite qualities and yet fail in the crucial test of strength. It is also possible, but in a minor degree, to have a cement that is of the required strength, but would yet fail to give the results expected of it when made into concrete or mortar.

From experiments extending over a considerable period, the results of which are given in the accompanying tables, I hope to be able by (1) determining the work which a cement has to do, and (2) by considering separately the properties which it should possess to attain that object, to arrive at such results as will be of value to both users and manufacturers.

Concrete or mortar, being a combination of aggregates which are united into a compact mass by means of the cement, it follows:—That the cement should possess strength; that it should be so finely ground as to thoroughly intermingle with and separate all the aggregates used, thus cementitiously uniting each particle; that it should set fairly-quickly and that it should neither expand nor contract during setting.

Without describing the manufacture of cement, which is carried out in various ways according to the nature of the raw materials used, it may be considered, for the purposes of this Paper, a combination of carbonate of lime, silica and alumina in certain proportions. These ingredients are obtained in different localities in various forms. Thus, on the Thames, the white chalk, which is nearly a pure carbonate of lime, is used in combination with Medway mud, which contains the silica and alumina. In many works on the Medway the grey chalk is substituted for the white, and Gault clay is used instead of the Medway mud. At Folkestone and other places on the South coast, similar materials are used. At Harwich, Newcastle-on-Tyne and Stockton-on-Tees, a local blue clay which contains the requisite

proportions of silica and alumina is used in combination with chalk, which is imported generally from the Thames. In the North of France—in the neighbourhood of Neufchatel and Devres—a natural cement-earth is found, generally at the foot of the chalk hills. This material, which much resembles grey chalk in appearance, contains in many instances the exact proportions of lime, silica and alumina for the production of a high class cement. At Rugby, in Somersetshire and other parts of England, the blue lias formation supplies the requisite ingredients, the stone and shale being found in layers of from a few inches to as many feet in thickness, one above the other. At Madras a cement is made from lime produced from sea shells, used in combination with a river mud, and I have lately been consulted respecting the manufacture of cement from somewhat similar materials, namely, coral lime and a river mud, found on the opposite side of India. At Rio de Janiero also similar raw materials are used. In Derbyshire the immense limestone hills may be made available for conversion into cement, in combination with a tufa which is also found in the locality. In Buckinghamshire, on an estate on which I am at present engaged, there has been found a deposit of a natural cement-earth, which lies immediately under the surface and averages about 10 feet in thickness, lying directly on the Oxford clay; with it is intermingled a considerable quantity of a nodular limestone.

It would be needless to enter more fully into the geology of Portland cement manufacture, but it may be taken that wherever carbonate of lime, silica and alumina are met with, in a fairly-easy convertible form, there Portland cement can be made. But with each variety of material different means must be employed for attaining the desired end; and to describe the process of manufacture in each case would take up more time than is at our disposal. The process may, however, briefly be divided into three stages, thus:—The thorough mechanical combination of the raw materials, their calcination, and the reduction of the clinker by grinding to the Portland cement of commerce.

From this very cursory glance at the materials from which Portland cement can be made, and the mode of manufacture, it will readily be seen that there are many causes which may materially affect the result of the cement produced: the quality of the raw materials themselves, their amalgamation in correct proportions, their perfect mechanical combination, the proper calcination of the combination, the perfect reduction of the clinker to a fine powder, and lastly the careful storage and cooling of the cement before it is used.

Of the causes of many of the results which may be met with, it is impossible to more than allude to, but assuming that the raw materials have been well chosen,—an imperfect amalgamation of them will probably produce a blowing cement; the use of an undue quantity of lime will produce the same result, combined with slow-setting powers, while the use of too much clay will produce a quick-setting cement, that will contract. Having secured the perfect amalgamation of the raw materials in the proper proportions, similar results may be obtained from imperfect calcination, thus a lightly-burned cement will be quick-setting and an overburned cement slow.

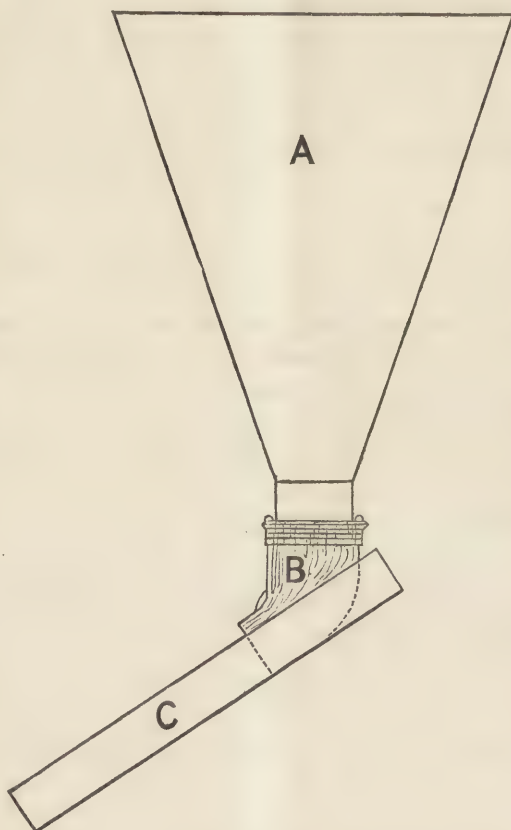
Having regard therefore to the number and combination of circumstances which present themselves for consideration, when it is required to divine the causes which produce certain results, I propose to treat solely with the peculiarities and properties which developed themselves during the experiments made with certain samples of cement, and to deduce

from these results certain data which may be of service in judging of the quality of a cement for the purposes for which it is required.

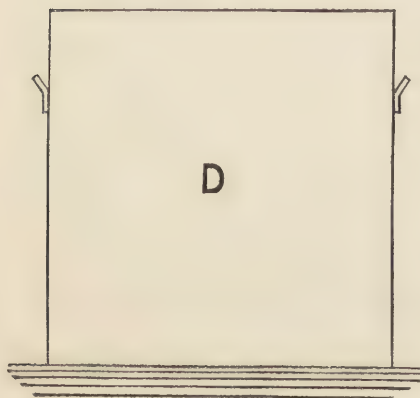
The quality usually required of cement is in accordance with the standard set out by the Metropolitan Board of Works in the regulations relating to concrete buildings, thus: That "the Portland Cement shall be of the very best quality, ground extremely fine, and weighing not less than 112 lbs. to the striked bushel, and capable of maintaining a breaking weight of 350 lbs. per square inch, after being made in a mould and immersed in water during the interval of seven days."

It must be admitted that, taken as a specification for cement, this regulation is rather vague, and as in all matters appertaining to the testing of cement great exactitude is required, and that a uniform and standard apparatus should if possible be adopted, I think that the Metropolitan Board of Works have it in their power by somewhat enlarging on this regulation to lead to the abolition of many abuses, and thus tend to the elucidation of many seeming contradictory results.

As the weight per



striked bushel of a cement must evidently vary according to the means employed to fill the measure, it is essential that it should always be filled in the same manner. The apparatus which I use, and which I think meets all requirements, is in accordance with the diagram No. 1. A is a circular iron hopper or funnel perfectly smooth on the inside, into which the cement to be weighed is placed; at the small end it has a canvas stocking B, which leads the cement into the zinc shoot C, placed at an angle of 55° , the



lower end of the shoot being five inches above the top of the measure. The measure D, placed on a perfectly firm floor, on which there is no vibration, is never in any way touched during the process of filling, nor until after it has been carefully struck with a straight edge. When filling the measure the stocking may be held in the hand so as to regulate the run of the cement from the funnel.

In a Paper I read before the Institution of Mechanical Engineers, in January 1875, when referring to the weight of cement, I said: "A light cement is

generally a weak one, though it may be of the requisite fineness; at the same time, a heavy cement if coarsely ground is also weak, and will have no carrying capacity for sand. As the more the clinker is burned the harder and heavier it becomes, and therefore more difficult to grind in the millstones, the heavy cements to be met with are almost invariably coarse ones; and as an under-burned cement from its softness will be ground fine enough but will be found deficient in weight, it will be seen that the weight, unless taken in conjunction with the fineness, is no test as to the quality of the cement."

This opinion I have found confirmed by subsequent experiments, the results of some of which are given in Table No. I. In each case the cement was weighed and tested as delivered and also when ground, so that all would pass through a No. 50 sieve. The tensile strengths given are in each case an average of ten briquettes.

TABLE NO. I.

					Residue per cent. after sifting through sieve having 2500 meshes per square inch.	Weight per struck bushel.	Tensile strength on section 1 in. square.	
							7 days.	28 days.
No. 1	{ Cement as delivered from Manufactory ...				25	lbs. 114	lbs. 535	lbs. 661
	{ Do. ground to all pass sieve 2500 meshes				Nil	104	572	not taken
" 2	{ Cement as delivered				16	116	509	650
	{ Do. ground				Nil	109	542	675
" 3	{ Cement as delivered				14	116½	476	662
	{ Do. ground				Nil	112	505	710
" 4	{ Cement as delivered				33	118½	693	728
	{ Do. ground				Nil	105	666	810

By examining these results, we find, firstly, that by fine grinding the weight per struck bushel is reduced, and, secondly, that the tensile strength is increased, both at the expiration of seven days and twenty-eight days from the time of gauging.

That the weight per bushel should be less, is what would naturally be expected, as it is evident that the finer particles are less dense than the coarse, and also that they fall lighter into the measure. That the fineness to which a cement is ground should affect the tensile strength in so marked a degree, may be accounted for by the fact that the coarse particles in a cement have practically no cementitious property, being little better than so much sand.

To prove this the following experiments were made with the core or coarse particles in a cement:—

1.—The residue that would not pass through a 625 mesh sieve was gauged with water,

and, at the expiration of seven days, was found to be merely held together in a mass similar to so much sand, having a slight admixture of loam.

- 2.—That which passed through the 625 mesh sieve, but would not pass through the 2500 mesh sieve, was gauged in a similar manner, and at the expiration of the same time was found to be in a similar condition.
- 3.—That which passed through the 2500 mesh sieve, but would not pass through a 4900 mesh sieve, being gauged in the same manner, was at the expiration of the same time found to be in a similar condition.

These experiments were made with a cement that was perfectly set in 30 minutes after gauging. In each of these cases the pats could be crumbled to pieces between the finger and thumb, and the granulations were the same in size and shape as before the water was put to them, thereby proving that the granulations themselves had no power of setting, but were simply held together by the infinitesimal particles of finely-ground cement from which it was impossible to separate them. It therefore seems that the granular portion, or the core of a cement, has really a deleterious effect on its strength, and for all practical purposes may be considered only as so much sand.

TABLE NO. II.

	Sample No. 1.		Sample No. 2.		Sample No. 3.	
	7 days.	28 days.	7 days.	28 days.	7 days.	28 days.
Cement as delivered from Works	lbs. 535	lbs. 661	lbs. 509	lbs. 650	lbs. 481	lbs. 650
Ditto all ground to pass } No. 50 sieve }	572	—	542	675	505	710
Siftings only passed through } No. 50 sieve }	547	697	573	668	452	629

Table No. II. gives the results of further experiments made with the same object. It will be seen that in samples Nos. 1 and 2 the cement was actually improved by extracting the core that would not pass the No. 50 sieve; but sample No. 3, which was a very finely-ground cement, slightly deteriorated; and it will be further noticed that all three samples were improved by fine grinding. Though in this Paper I am not going into the strength of mortars, it would be well to say that the fine grinding would give a more decided advantage in the case of mortars than in neat cement.

Many people, even some manufacturers, consider the core to be the back-bone of the cement, and to a certain extent they are in the right, but the result of these experiments proves that to be of value it must be ground. It is naturally the hardest burned particles which form the core, those which the mill stones have been unable to grind, through their being of a harder nature than the rest of clinker. The core, therefore, as core, is really only so much sand in the cement, but when ground acts in most instances beneficially and improves the quality of the cement.

TABLE NO. III.

No.	Specific gravity.	Weight per struck bushel.	Residue per cent.		Tensile strength per square inch.		Increase. per cent.
			No. 25 sieve.	No. 50 sieve.	7 days.	28 days.	
		lbs.			lbs.	lbs.	
1	3.09	116	2	16	509	650	27.7
2	3.00	116½	¼	13	400	550	37.5
3	3.00	116½	0	14	471	594	26.1
4	2.99	118	4	28	605	772	27.6
5	2.96	116	4	26	586	767	30.9
6	2.95	113½	3	33	473	558	17.9
7	2.90	111	7	30	701	718	2.4
8	2.90	118½	8	33	693	728	5.0

Table No. III. gives the results of experiments made with eight samples of cement, showing the specific gravity, weight per bushel, fineness, tensile strength at 7 and 28 days, and the increase per cent. between those dates. If we examine the specific gravity and weight per bushel in conjunction with the fineness to which the cement is ground, it will be seen that a heavy weight per bushel and a heavy specific gravity denote a well-ground cement—while a heavy weight per bushel and a light specific gravity denote a badly-ground cement.

It has been proposed to substitute the specific gravity for the weight per bushel when testing cement, but it must be remembered that the object of testing cement is not only to determine the actual strength of the cement at a given date, but to be able to form a fairly accurate opinion as to its probable behaviour in practice. I therefore think that to do away with the weight-per-bushel test, would be, to say the least, undesirable, as when taken in conjunction with the fineness a very fair opinion can be formed of the value of a cement,—an opinion which can be confirmed by afterwards taking the specific gravity; in fact the specific gravity, weight per bushel and fineness bear a certain relative proportion to each other, indicating either a light or heavily-burned cement. By again referring to Table III. we find that the cements having a light specific gravity are quick-setting cements, which in seven days have already attained great strength, but which show but little improvement afterwards, while those having a heavy specific gravity are slower in setting, and at seven days do not show such good results but continue to improve for a longer period.

It is unfortunately impossible to lay down an absolute rule by which to determine the value of a cement. Almost every property, whether to its advantage or disadvantage which it possesses, may be traced to more than one cause, and therefore might lead to opposite results in practice; and when it is remembered that an opinion to be of any practical utility

must be given in a few days, and before the cement is required for use, it becomes entirely a matter of experience and thorough knowledge of the process of manufacture, to be able to give a reliable opinion as to the suitability of a cement to the work for which it is intended, by reference only to the problematical tests.

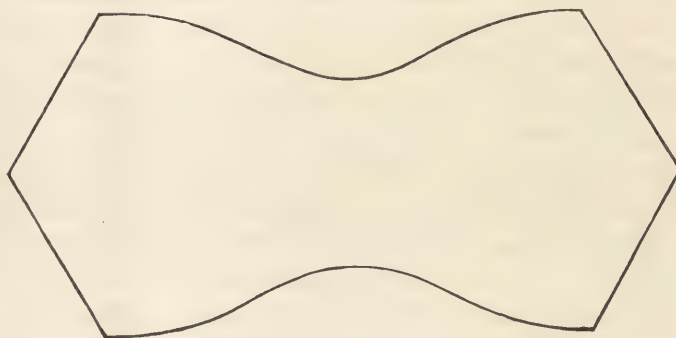
Having considered what I have called the problematical tests of cement, namely, its weight, fineness and specific gravity, and shown the results which may be expected by this preliminary examination, there remain to consider the absolute test of tensile strength, and the manner in which it is carried out. The object of the test for tensile strength is to obtain the best possible results under certain conditions. The conditions are generally those already given in the extract from the regulations of the Metropolitan Board of Works.

It is evident that to obtain the best result much must depend on the manipulation of the cement, the manner in which it is gauged, the amount of water which is used for the purpose, the care with which it is placed into and removed from the moulds, the length of time which is allowed to elapse after gauging before it is placed in the water, the form of the mould used, and many other minutiae of manipulation which can only be acquired by actual experience and practice. The amount of water which is required to reduce a cement to a proper consistency, or technically to properly gauge it, varies from 15 to 20 per cent. A quick-setting cement generally requires a larger percentage of water than a slow-setting one, but the exact amount required can only be determined by actual experiments with the sample under examination. The amount of water required also depends upon the skill of the manipulator, as an experienced gauger will bring the mass to a proper consistency with less water than another of less experience or skill, and as the amount of water used materially affects the result obtained the importance of using a minimum cannot be over estimated. Many of the discrepancies which arise when testing cement are undoubtedly due to this cause. With the object of overcoming this difficulty I have devised a small machine for gauging cement, and I find that by its use less water is required, and that the operation of gauging is done much quicker, both points which materially affect to its advantage the result obtained.

The custom seems to have become general that the briquettes should be placed in water twenty-four hours after gauging; this time, though it is perhaps convenient to gauge up on one day and place the briquette in water on the next,—and gives a slow-setting cement every chance,—still, it certainly does not act beneficially on a fairly quick-setting cement, and it is generally advisable to place the briquette in water as soon as it is possible to remove it from the mould without fear of damage, and the twenty-four hours may be taken as the limit of time; as, though a cement which has not by then set sufficiently to bear removal from the moulds may be a fairly good cement, it is too slow in setting to be of much practical value. Again with regard to the area of breaking section of the briquette it is usual to specify that the cement shall carry so much on the square inch, and yet the briquette generally in use has a breaking section of 1·5 inches square, giving an area of 2·25 inches. How this custom has arisen I am unable to say, but it would undoubtedly greatly assist in clearing up many of the discrepancies now to be met with if one uniform section and form of briquette were adopted, and inasmuch as the strength on the square inch is specified, it would seem natural that the briquettes should have that area of breaking section. It will be readily understood that the form of the briquette has much to do with the result obtained, and it is essential that the strain put on the briquette should be

tensile only, all crushing forces being detrimental and often resulting in the fracture occurring elsewhere than at the smallest part, and hence giving a false result. Also that the briquette should be capable of easy removal from the mould in which it is gauged—avoiding all necessity of knocking the mould in order to remove it—as such is liable to injure the set of the cement. After experiments with many different forms of briquettes I have adopted the form shown on diagram No. 2 as the one which best meets most requirements, and which certainly gives the best results of any I have yet tried.

There is another matter which seems to have been overlooked, or at all events not estimated at its full value, by experimenters with cement, namely, the increase in strength between a briquette broken at the expiration of seven days and at the expiration of twenty-eight days. Many



cements will stand the ordinary test at seven days, and yet be utterly worthless at twenty-eight days; others will give a good result at seven days and improve but little afterwards, while a cement that gives a comparatively low result at the expiration of seven days may at the expiration of twenty-eight have considerably increased in value. The result of the subjoined experiments shows that this is a most important matter in estimating the ultimate strength of a cement.

TABLE NO. IV.

No.	Tensile strength, section 1" square.			Increase or decrease per cent. at 28 days.	Increase or decrease per cent. at 3 months.
	7 days.	28 days.	3 months.		
	lbs.	lbs.	lbs.		
1	380	210	...	- 44.73	
2	701	718	728	+ 2.42	+ 3.85
3	510	647	716	+ 26.86	+ 40.39
4	605	772	826	+ 27.60	+ 36.52
5	476	662	...	+ 39.07	
6	693	728	...	+ 5.05	
7	589	764	901	+ 29.88	+ 52.97
8	666	810	...	+ 21.62	

By an examination of Table IV. it will be seen that No. 1 was a cement that actually satisfied all requirements at the expiration of seven days, and yet at twenty-eight days was actually worthless, being much blown and consequently having no strength whatever; and it would undoubtedly have pulled to pieces any work in which it was used. Nos. 2 and 6 were both strong quick-setting cements, and showed good results at

the expiration of seven days, in fact they seem in that short time to have attained almost their ultimate strength, as their increase during the next three weeks was but 2 and 5 per cent. The other samples show results varying from 20 to 40 per cent. increase in tensile strength between the seven and twenty-eight days, and it will be seen that at longer dates the quick-setting cements are by no means the strongest.

The importance of fine grinding is again exemplified by examples Nos. 6 and 8. No. 6 is the cement as received from the works—33 per cent. of it would not pass through the No. 50 sieve. No. 8 is the same cement, but ground so fine that it would all pass the same meshed sieve; while in the cement as delivered, the increase in strength between the seven and twenty-eight days was but 5 per cent.—when ground it amounted to 21 per cent.

TABLE V.

	Percentage of water used.	Tensile strength at 7 days.
No. 1	15.2	lbs. 520
„ 2	15.8	445
„ 3	17.8	346

By examining Table V. the great loss in strength by using too much water for gauging the cement, and the consequent advantage of using the minimum quantity by which the mass can be rendered plastic, are apparent.*

In this Paper I have treated solely of what may be considered good cements, and have given the result of the tests made with them under different conditions. The failure of a cement by expansion or contraction during the process of setting has not been brought under consideration, but it is needless to say that a cement which

does either would be a dangerous cement to use, the only exception being that a good cement will sometimes blow if used too soon after it has left the mill and before it has had time to cool; but such a cement would after being properly warehoused be perfectly reliable.

The deductions which I have endeavoured to prove from experiments are:—

- 1.—That the weight per struck bushel, unless taken in conjunction with the fineness to which the cement is ground, is absolutely valueless as a guide to the quality of a cement, and that therefore the two should always be taken in combination, and that it is also advisable when possible to take the specific gravity.
- 2.—That the finer a cement is ground the less it will weigh per struck bushel, but that it will at the same time be stronger.
- 3.—That the core or coarse particles in a cement act deleteriously, and can be compared only to so much sand.
- 4.—That to be able to form a true opinion of the value of cement, briquettes should, when practicable, be tested at twenty-eight days as well as at seven, and that the greater the increase per cent. is between those dates the stronger and harder is the cement likely to become.

The details of the weight and fineness, and other matters deduced from the foregoing tests, I have embodied somewhat in the form of a Specification which I think meets most

* The results of the tensile strength given, throughout the Paper, are in each case the average of either five or ten briquettes, and the percentage of water used is in every case taken by weight.

requirements, but the purposes for which a cement is to be used must of necessity govern many clauses. Thus:—

SPECIFICATION.

Sample.—From each delivery of cement on to the works a sample of about one bushel will be taken indiscriminately from at least twelve sacks or casks, as the case may be, and will be subjected to the following tests, with the whole of which it will have to comply. The sample thus taken will be considered to indicate the quality of the entire delivery.

Fineness.—The cement to be so finely ground that it will all pass without leaving any residue when sifted through a copper wire sieve having 625 holes to the square inch, and when sifted through a similar sieve having 2,500 holes to the square inch, the residue, or that which is unable to pass through, shall not be more than 15 per cent. of the bulk before sifting.

Weight.—The weight per struck bushel to be not more than 116 pounds nor less than 108 pounds, but the weight must in all cases depend upon the fineness:—thus, according to requirements, a cement which, when sifted through a sieve having 2,500 holes to the square inch, leaves a residue of from 12 to 15 per cent. must weigh not less than 112 pounds per struck bushel; should the residue be from 8 to 12 per cent. the minimum weight to be 110 pounds, and should there be less than 8 per cent. residue, the minimum weight to be 108 pounds per struck bushel. The bushel measure to be placed on a level floor where there is no vibration, and in every case filled from a zinc or other smooth-surfaced shoot, placed at an angle of 55 degrees, the lower end of the shoot to be 5 inches above the top edge of the measure. The cement to be allowed to run continuously along the shoot until the cement in the measure is well piled up, when it is to be struck level with a straight-edge. In no case is the measure to be in any way touched or shaken until it has been struck.

Specific Gravity.—The specific gravity to be not less than 2.95 nor more than 3.1.

Tensile Strength.—Twenty briquettes to be gauged from each sample, ten to be broken at the expiration of seven days from the date of gauging, and ten at the expiration of twenty-eight days from the date of gauging. Those broken at seven days to carry an average weight of 400 pounds per square inch of section without fracture, and those broken at twenty-eight days to show an increase in strength of 25 per cent. over those broken at seven days. The following particulars are to be observed in gauging the cement to form the briquettes:—

The contractor to use any form or section of mould he chooses in which to make the briquettes, provided always that the breaking sectional area of the briquettes be not less than one square inch. The moulds in which the briquettes are made to be placed on glass or other non-porous beds. The amount of water used for gauging the cement not to be more than 19 per cent. of the whole. The briquettes to be removed from the moulds and placed in water within twelve hours from the time of gauging, and allowed to remain therein until they are due for breaking (which will in every case be reckoned from the time of gauging and not of placing in water), and to be broken immediately on being taken out of the water.

Expansion or Contraction.—Pats about 3 or 4 inches square and about half an inch in thickness (gauged with the same percentage of water as is used in forming the briquettes), placed on pieces of glass, to be immersed in water within four hours from gauging, and to show neither cracks on the edges nor on the surface, nor deviation in form when examined at the expiration of seven days.

DISCUSSION.

Professor ALEX. B. W. KENNEDY, M.Inst.C.E.—The subject of this Paper is of quite as much interest to engineers as to architects and of quite as much importance. The author's method of treating it has, however, kept him from mentioning many points of considerable importance which ought to be looked at, for some of them are too often neglected. I should like, in the first place, to say a word or two about some of the points which he has mentioned. On page 113 he gives experiments as to the non-cementing of material which passes through very small meshes, which I must say took me by surprise, as I dare say they would many who have not tried them. I had the curiosity to test the question for myself, and with a result which exactly tallied with his. I took a couple of pounds of a fairly quick-setting cement of which 17 per cent. passed through a No. 50 mesh (2,500 to the square inch), while 71 per cent. passed through a No. 70 mesh (4,900 to the square inch), and the remaining 12 per cent. I made into a cake. At the expiration of 44 hours it had not set in the least. I find that Bauschinger has experimented upon this also. He took cement which, as delivered, had a tenacity of 398lbs. per square inch after four weeks. The part of this cement which went through a 5,800 mesh had a tenacity somewhat less at the same time. That, however, which was left behind had at best a tenacity only about one-fifth of its original strength, and in some cases would not set at all. There is a matter on page 115 which I am sorry to say I am not able to see in the same light as Mr. Faija. He says that as we express loads in pounds per square inch, it would seem natural that the briquettes should have one square inch of area. If this were any valid reason whatever, then on the Continent briquettes should have an area of a square centimètre, which of course no one would think of proposing. The question of reducing one area to another is merely an arithmetical one, and the proper area must be decided on quite other grounds than that suggested by the author. I confess my own leaning is rather to larger briquettes, for the reason that, so far as I know from my own experience and from the experiments of other people, the smaller a briquette is the more does its resistance depend on the skill of the man who gauges it, and the less does the result obtained from it have any direct bearing on the practical value of the cement tested. The large briquette will of course give in general a much smaller result than the small one, but a result which is much more independent of specially skilled manipulation, and of much greater practical value. I, myself, am using a briquette of standard area ($2\frac{1}{4}$ square inches) of a form designed by my friend, Mr. R. H. Willis, with the special object of getting the line of pull exactly in the axis of the briquette. It has conical ends with flattened sides, and gives very good results. Bauschinger, who probably has made more experimental determinations on this subject than any other man, uses simply a rectangular block of $2\frac{3}{8}$ inches by $4\frac{3}{4}$ (72 square centimètres) and grips it between wedges; his cross section is thus 11 square inches. Indeed I am disappointed that Mr. Faija has not said anything about the experiments which were completed about twelve months ago by Professor Bauschinger (of Munich), which contain somewhere about 15,000 separate determinations (summarized by the author), including all the points on which

Mr. Faija has given results, and a great many more. He has tested neat cement after one, four, eight, twelve, sixteen and 120 weeks, cement mixed with sand in various ratios, cement old and fresh, large and small briquettes, and briquettes moulded in different ways, shearing strength, crushing strength and bending resistance, as well as tensile strength, specific gravity, chemical constitution, absorption of water, increase in volume in drying and many other matters. I know of no more complete monograph on any subject, and it would have been of much interest if the author had given us some summary of the results. It is customary for some reason or other to test cement only in tension. I do not know why, for we certainly take care not to utilize its resistance to tension at all; we subject it either to crushing or to shearing. There is no difficulty about testing cement in compression, for cubes will break by crushing as fairly as any briquettes, and their breaking point is quite as determinate. It is often assumed that the compressive resistance bears some constant ratio (often 10 times) to the tensile strength. This, however, is a mistake. The ratio varies from 7 to 13, and the mere tenacity of a cement is no guide to its compressive resistance. I may give you three sets of experiments that I have made myself recently on $1\frac{1}{2}$ inch cubes cut from ordinary briquettes. With a slow-setting cement, having a tenacity of 490lbs., the crushing resistance was 5,200lbs., or nearly 11 to 1. With a quick-setting cement of 522lbs. tenacity, the crushing resistance was 4,510lbs. per square inch, or 8.64 to 1; while a third cement of medium quality gave the figures 326 and 2,620lbs. per square inch respectively, or 8 to 1. The resistance to crushing increases with time more quickly than the tenacity, that is to say, a ratio 8:1 after one week becomes in sixteen weeks 10:1 in the average of a great many of Bauschinger's experiments. The crushing resistance of flat plates is of course much greater than that of cubes, but the exact point of destruction is not so easily determined. With the shearing resistance I have not myself made any experiments, but I find that the average of a very large number of Bauschinger's which I have examined, is that the shearing resistance of cement varies little from being 25 per cent. greater than its tenacity. It is singularly uniform, and it increases with time as the tenacity increases. My colleague, Professor Lewis, has asked me if I could say anything as to the elasticity of cement, but I had not experimented on this point, and have only had time just to look at it. I planed down an unbroken briquette into a prism $6\frac{1}{4}$ inches long and $1\frac{1}{2}$ inches square; I put that in my testing machine and bent it. To measure the deflection, Mr. Willis schemed a simple telescopic apparatus, and the deflections I got were: with a load of 50lbs. (applied at 2 points 4in. apart), 0.0025 of an inch; with 100lbs., 0.0066; with 150lbs., 0.01 inch; and at 175lbs. the piece broke. I merely mention this experiment as a matter of curiosity, and to show that cement *will* bend, although the deflection is so very small. The maximum tensile stress which cement will stand in the form of a beam before it breaks, calculated in the usual fashion, Bauschinger appears to make somewhere about three times the direct tenacity. That I have been unable to verify myself, but I have no reason to doubt his correctness. The question of the way in which a cement shall be allowed to set before testing is of some importance. On the Continent they seem to be more fond of drying in the air than we are. No doubt, as a rule, cement which has been in water for a long time has a tenacity higher than that which has been in air only, but I do not find that the crushing resistance is affected in the same way. When, however, the cement is not neat but mixed with sand, it does not appear to make any difference whether it is dried in air or under water. Another point

which has been several times mentioned in connection with the testing of cement is the question of moulding under pressure. One uses the cement under pressure of course, so this appears a point of some practical interest. I moulded some briquettes last week specially to try this point. I put 300lbs. on each briquette, which corresponded to a pressure of about 20lbs. per square inch, and their average tenacity was 505lbs. per square inch (the minimum being 454lbs. and the maximum 555lbs.), while the mean of 13 ordinary briquettes of the same sample was only 273lbs. per square inch (the minimum 240lbs., the maximum 340lbs.). The tenacity was increased 1.85 times, although the new briquettes had only been under water $4\frac{1}{2}$ days and the other 7 days. The question whether cement is injured by being kept in bulk has often been discussed. Bauschinger has examined this point also, and having tested some 1,500 to 1,700 briquettes made from cement which he had stored from 3 to $3\frac{1}{2}$ months in a dry place before moulding, the results were somewhat less regular than with briquettes made from fresh cement, but the average strength was nearly the same. And now, lastly, as to the general question raised by Mr. Faija's specification. I fear that, unless you are much fonder than we engineers are of very elaborate specifications, such intricate clauses can never be of any use, and that even if they were inserted they could never be adhered to. I would, however, make a suggestion. It being unquestionably of importance that cement should be properly tested, and equally true that if it be not tested in a uniform fashion the results will have comparatively little value, it might be possible for the Council of the Royal Institute of British Architects, in conjunction possibly with the Council of the Institution of Civil Engineers, to agree upon some standard method of testing cement. Then it would be an easy thing to put in a specification that the cement was to be tested according to an acknowledged standard, and would save all such long and minutely particular clauses as those suggested by the author, which, moreover, might and would be altered by different people in one and another detail until the whole affair became hopelessly confused. If this were done I would make two further suggestions: first, that the size of the briquette should be rather increased than diminished, and secondly, that the compressive resistance ought to be made a part of the test, if, indeed, it should not altogether replace the test for tensile strength.

Professor KERR, *Fellow*.—I have listened with very great pleasure to what has been said by Professor Kennedy, and I must say with a little more interest than that which I found in the Paper itself, for it struck me that the learned lecturer has imparted very little information that would practically apply to the use of Portland cement by ordinary builders. As for introducing in our practice such a test as he speaks of—that is perfectly out of the question; and if, under the new Act of Parliament, the District Surveyors, of whom I see a distinguished leader present, are to apply such a test as that to every sack of cement brought on a building, I do not know where it is to end. What Professor Kennedy suggests as a simple test strikes me as being exceedingly serviceable. I thought while the Paper was being read that the tensile strain was one which it seemed difficult to proceed upon, and that the compressive test would serve our purpose a great deal better. It seemed to me that the test might be reduced to some such form as this—that a certain weight of cement, no matter what cement, might be mixed with a regulated quantity of water and placed after a time (without any of this ceremonial about being so many days under water), when thoroughly set and dry, under some simple crushing process. Then it seems to me that it would be the easiest

thing in the world to determine whether it was fit for our use or not. We do not care whether it is coarse or fine, all we care about is the effective strength; and it seems to me that the compressive test would determine that, and also that it might be determined with the least possible trouble. All this information about the German researches is very interesting no doubt to those who may have years to spend upon it, but as we architects use cement something very much simpler must be put before us. I was glad to find the author at the end of his discourse mentioning that with cement as with everything else of the kind the less the quantity of water the better the result. The reason is plain: the water has to be evaporated out in course of time, and that which is so evaporated must necessarily leave a vacuum behind (filled with air of course); therefore in plain language the more water there is put in, the more water there is to evaporate out, and the more porous is the cement. We thus come back to the process of M. Coignet, which must have made an impression upon the minds of many persons present: that, with perfect manipulation and perfect materials, the smallest quantity of water always produces the best mortar—or the best artificial stone in his case. Gentlemen are no doubt aware that the quantity of water M. Coignet uses in his *béton* is so extremely small as to be almost incapable of being discovered in the powder which is ready by pressure or gentle percussion to be converted into the artificial stone. On the whole the information conveyed to us by Mr. Faija and Professor Kennedy is extremely useful, and I hope we shall hear the opinions of others upon the subject. One will think of what another will not, and seeing that cement is coming more and more into use it is extremely important that we should thoroughly understand its qualities. There is one respect in which cement is being extensively introduced which I think requires to be considered by architects, and it has not been mentioned to-night. I refer to fire-proof floors. We find iron joists placed at certain intervals and cement slabs, whether flat slabs or so-called arched slabs; and it seems desirable that we should understand the exact behaviour that is to be expected from such slabs.

Herr GUSTAV GRAWITZ.—I quite agree with the greater part of Mr. Faija's able Paper, for its contents generally correspond with the results of numerous experiments made in Germany with German Portland cement; I desire, however, to make a few remarks in order to draw comparisons between English tests and German tests, and to submit suggestions which may be of some use. As Portland cements are never used neat, but always mixed with sand in mortar or concrete, the Germans have substituted the tests with briquettes made of neat cement for those with briquettes made of mixtures of cement and sand. I am surprized to hear Mr. Faija state that tests made by the Metropolitan Board of Works are still carried on with briquettes of neat cement; for a new specification, in accordance with the German system, was introduced by the Board last October. The cement is now gauged with three times its weight of dry sand which has passed through a sieve of 400 and been retained upon one of 900 meshes to the square inch, by which process the coarser and finer particles are eliminated. All the briquettes have to bear a tensile strain of 140 lbs. per square inch after having been forty-eight hours in air and twenty-six days in water. The German rules require a tensile strength of ten kilogrammes per square centimètre, or 142.2 lbs. per square inch, and the standard sand used in Germany is clean and dry quartz sand which has passed through a sieve of sixty meshes per square centimètre (387 meshes per square inch)

and been retained upon one of 120 meshes per square centimètre (774 meshes per square inch). At the Metropolitan Board of Works the briquettes are kept two days in air and twenty-six days in water, whilst in Germany they are kept one day in air and twenty-seven days in water. I quite agree with Mr. Faija that the briquettes should be broken directly on being taken out of the water in order to secure uniform results, for it has been proved that they lose in strength if afterwards kept in air during a lengthened period. I cannot, however, agree with his statement that all Portland cements before using should be properly seasoned or cooled, for it is well known in Germany that a very good brand of slow-setting Portland cement can, at any time, be safely used direct from the mill. In fact a slow-setting Portland cement cannot be considered a good one if it require seasoning, but it is different in the case of quick-setting cements, from which great strength and reliability cannot be expected. With regard to the degree of fineness of cement as specified by Mr. Faija, namely, "No residue on a sieve of 625 meshes per square inch," I do not object to that. German Portland cements are often so finely ground now that, if passed through a sieve having 180 meshes per square centimètre or 1,161 meshes per square inch, they leave not over 0.2 per cent. of residue. Mr. Faija proposes that not over 15 per cent. of residue should remain on a sieve of 2,500 meshes per square inch; this is decidedly too much, for finely-ground German Portland cements do not leave more than 2 per cent. of residue on such a sieve. The last specification of the Metropolitan Board of Works requires that 80 per cent. of the cement shall pass through a sieve of 5,800 meshes to the square inch, about the same degree of fineness as prescribed by the German official rules, still there are German manufacturers whose produce never leaves more than half this amount of residue, or about 10 per cent. on such a sieve, and sometimes even much less. The weight per struck bushel is specified by Mr. Faija to be not over 116 lbs. and not under 108 lbs. Now, although it is quite true that the weight, unless taken in conjunction with the fineness to which cement is ground, is absolutely valueless as a guide to the quality, and that therefore the two should always be taken in combination, it appears to me that the mode proposed by Mr. Faija is too complicated for ordinary practical purposes. Finely-ground and strong German Portland cements never weigh more than from 110 lbs. to 112 lbs. per struck bushel, and as already stated some time ago by Mr. Bramwell, and corroborated by Mr. Grant's valuable experiments, the test for heavy weight is merely a premium for bad grinding calculated to mislead, for badly-ground cement means inferior cement. As already proposed by Professor Kennedy, a uniform method of valuation is a matter of great importance for both manufacturers and users of Portland cement. The German system of official rules works admirably, and it is a pity that independent public testing rooms under Government control, such for instance as the Testing Department for Building Materials at the Royal Industrial Academy in Berlin, are not yet established in England. However reliable and trustworthy a private Portland cement tester may be, sellers and buyers very frequently disagree as to employing for this purpose the same person, and thus difficulties arise. The best reputed German Portland cement manufacturers guarantee their produce to have certain degrees of tensile strength if tested according to the official German rules. This is of great importance, enabling users to rely with confidence on the quality of a cement, whilst the security which such reliance must engender adds greatly to the consumption of Portland cement. A drawback still in existence is that those manufacturers who give themselves the utmost trouble and do not shrink from extra expense in order to produce a thoroughly good

Portland cement, much stronger than is generally specified, cannot in many instances obtain a higher price than those who supply a commodity worth much less in reality and which merely comes up to the requirements of the specification. This is no inducement for manufacturers to improve their produce. Portland cement, therefore, provided it stands the preliminary tests for fineness, weight, expansion and contraction, should be valued, like every other merchandize, according to its quality, namely, tensile strength, as for instance in the case of alcohols, where the overproof is paid for. A cement at 50s. per ton may be much cheaper than another cement at 40s. per ton; this depends entirely on the quality, namely, the quantity of sand with which each cement can be safely mixed. Architects and engineers have every interest to use only the very best materials. Many consumers of Portland cement have no idea of the enormous waste which always takes place when weak cements are used, besides it is obvious that if 300 tons of one cement can safely do the work of 500 tons of another cement, the preference ought to be given to the former, and a deal of superfluous expense saved on cartage and freight. I venture to submit that the establishment, in England, of a public testing department for the building materials under Government control would be in the interest both of producers and users of Portland cement, and that official rules for a uniform method of valuation of Portland cement should be agreed upon. I also think that Portland cement in future should be valued like every other merchandize, according to its quality, namely, tensile strength.

Mr. HENRY SHARP (Bourne Valley Pottery and Concrete Tube Works, Poole).—The tensile test at seven days, the tests for fineness and for weight are useful as being the earliest that can be made, and as affording to some extent useful information, but the test which from a consumer's point of view I rely on is the tensile strength of a mortar or concrete twenty-eight days old. This mortar should be in my opinion gauged one of cement to three of clean sharp sand. These are the proportions adopted in Germany as a standard, and the minimum breaking strain is fixed at 105 lbs. per square inch section. This, however, is absurdly low, and one well-known German firm of cement manufacturers offer me cement which they guarantee to produce a mortar breaking at not less than 284 lbs. per square inch at twenty-eight days, the gauging being one to three. At my works the cement we use is subjected to a similar test, but as a rule gives considerably higher results. The mixture is a concrete rather than a mortar, the briquettes being samples of the pipe mixture taken daily as it comes from the mixing machine. We are not satisfied with less than 350 lbs. at twenty-eight days, and we find that with well-ground cement, and carefully proportioned aggregates, our briquettes will sustain even 400 lbs. and upwards at this age, those made from the German cement beforementioned being among the highest. Cement manufacturers may reasonably say that they cannot allow the reputation of their cement to depend upon what consumers choose to mix with it, and I willingly admit that our concrete test briquettes are not mixed with mathematical accuracy such as would obtain in a laboratory, our object being to ascertain the strength of the material that is being made into a pipe. We, however, are able to quote these tests to manufacturers who supply us, because they are aware of the care we give to the subject—indeed the results we obtain are evidence of this fact. Hence it is of no use for manufacturers to tell us that their cement gauged neat breaks at 600 lbs. at seven days (which figure by the way I have never been able to reach with *any* cement) if we

find that our concrete made with it does not touch 250 lbs. at twenty-eight days. The value of a cement to the consumer consists in the amount of aggregate it will carry, retaining the requisite strength; and to ascertain this there can be no simpler test than the above. If the breaking strain, the appearance of the briquette and of its fracture are satisfactory at the age of twenty-eight days, it is quite certain that the concrete has nothing but a future of increasing strength before it. The only objection that I can see to this test becoming a standard one is that which, as I have already hinted, would be raised by the manufacturers of cement. If Mr. Faija is able to provide the answer to this objection I feel sure that such a recognized system of testing would often be found of very practical value to both buyer and seller, and of course there are cases where an independent chemical analysis may be required by one party or the other.

Professor LEWIS, F.S.A., *Vice-President*.—The subject which Mr. Faija has brought before us is by no means new to him, and I remember well a lecture which he gave some years ago upon it, when the well-known engineer, Mr. Bramwell, was in the chair. But we must bear in mind, in considering the whole subject, the very valuable experiments carried on for a series of years by Mr. Grant, of the Engineer's Department, Metropolitan Board of Works. It seems to me that tensile strength is really of comparatively little use to us unless it bears some direct proportion to that of the crushing and shearing strength. In actual practice, the weight which is put upon it acts directly as a crushing force, or, as in the case of a settlement, either as a shearing or bending force,—the question being in the latter case whether it would have such a degree of elasticity as to allow even the slightest settlement to take place without breaking the cement. I think that Professor Kennedy's experiments on this question are very interesting. They supply a want which we have felt, and unless the tensile strength has a definite relation to the crushing and shearing, the tensile may or may not show a good cement, but it is not a sufficient test for use. Another point likewise which Professor Kennedy has investigated is the difference of strength between the briquettes when the cement is simply poured into them in the usual way and when they are subjected to the crushing force. Of course in actual work a bricklayer puts on a layer of cement which receives the weight of brick or stone upon it at once. It is thus pressed directly by a heavy weight until the cement is set, and, therefore, to test the strength of the cement without the pressure upon it, is to test it in a way in which it is not used in actual buildings. For many years I have been carrying on a series of microscopic observations on the way in which cements and limes of all kinds set. I need not explain in this room the theories about the setting of mortars and cement, but the precise way in which the setting takes place was not investigated, I think, by Mr. Grant, and is still a subject not clearly known. I began the investigation some nine years ago under very favourable circumstances, that is, in a house in North Wales with a northerly aspect, and it was with a microscopic power of 110 diameter. I will allude now to Portland cement only, which I tried at first in its dry powdered state. Before it was put in, it had a perfectly uniform grey tint; under the microscope it resolved itself at once into very minute brownish white specks lying upon a substratum of a black vitrified mass. I was puzzled at that, and of course the first thing was to know what that vitrified mass was. I sifted it through first of all the 50 sieve, that is the 2,500. The appearance was just the same; I saw these brownish white specks exactly as before on the black substratum. I then

passed the powder through another sieve, a great deal finer than anything you have seen to-night, having 14,400 perforations to the square inch. The cement was not a selected sample, but was taken at random from some used in a building which was being carried out under my direction, yet a large portion of the cement passed through the 14,400 sieve, and I had still the white specks and the black substratum. I separated them at last by dropping the cement gently into water, and then before it had time to set I poured out the lighter portion, mixed the residuum again with water, and so on until I got a deposit nearly black. Unfortunately I had to give up the investigation, and I have not had this dark deposit analyzed. My own impression is that the lime in the cement was not chemically combined with the clay, and that, therefore, I had got the strongly-burnt clay separated from the lime. But I have Mr. Faija's authority for saying that he has had that investigated, and that the lime and clay are chemically combined. I afterwards tried Portland cement mixed with water and very fine washed sand—one of cement and two of sand pressed down. The microscope resolved this into a loose mass of sand grains, with a very large proportion indeed of spaces in between. On each grain of sand minute granules of brownish white (evidently the cement) were scattered. The cement when fairly set gave no appearance of a pasty mass filling up the places between the sand grains, but presented the same appearance as at first, except that it had turned them quite white, the white granules being scattered over the sand, and the only parts in which they could be connected were where the grains of sand joined and where the little granular specks upon them likewise of course joined. A number of very curious results which I found, not only in regard to cement but of mortars, &c., might be interesting, and I may hereafter complete my investigations and bring them before you in a more definite form. Possibly these few remarks, though of no great practical use, may induce some to investigate the subject of the setting of cement in a different way from that which has usually been tried.

The PRESIDENT.—It occurred to me before this Paper was read that possibly the subject matter might have ramified to a larger extent than it has. Able as no doubt the Paper is, it is confined very much within the limits of the testing power of cement; whereas to architects the use of cement and plaster present broad and important features. I think, however, that within the limits the reader has assigned himself he has treated his subject ably and well, and that the discussion has been practical and useful. The suggestion made by Professor Kennedy is one that should have due consideration on our part; and it would be of very great utility, supposing that we were able to see our way to do it in conjunction with the Council of the Institution of Civil Engineers, to establish a standard method of testing cement. I quite agree with Professor Kerr, who, I think, made the remark that anything like the elaborate calculations and experiments suggested in the Paper would be impracticable in the majority of the works with which we architects have to do. Great and important as the tensile strength of the material may be, equally important is the manipulation of the material; and if the writer of a future Paper on Portland cement could define a rule by which we could frame a specification that would describe the use of cement when in its very best form, and avoid those miscalculations arising from bad manipulation, the use of bad cement, the undue quantity of water with it, and matters of that kind—he would render a great practical service to the majority of the Members of our Body.

HENRY FAJJA, Assoc.M.Inst.C.E.—I have to thank you very much for your kind reception of the Paper, and I am glad that Professor Kennedy agrees with me in the experiments he has made in respect to the non-setting powers of the core of a cement. It is a question which I believe has been disputed by many people, and which I have tried to make perfectly clear, and when I have Professor Kennedy on my side I am quite sure that I am right. As an additional proof I gauged a small pat yesterday, and it is now perfectly set and hard; it is made from some core which had previously been mixed up with water. Now, as cement will not set twice, if the core had set when it was first wetted it certainly would not have set at the second wetting and when ground fine. Professor Kennedy objects to the tensile strain, and many other speakers have said the same thing. Now I do not think that, in the matter of testing, it is of the first importance whether you use compression or whether you use a shearing strain, whether you use tensile strain or whatever you use, for it is known that they all bear a relative proportion to each other. The best thing to use is the easiest. I think that the tensile is the easiest applied and the easiest used, and therefore I think it is the best to adopt. We have not all such beautiful machines and appliances as Professor Kennedy, machines that will crush and do everything else. We have to put up with small machines that cost a few pounds, and we must be satisfied with what tests we can carry out with them. The elasticity of cement—I do not think that has been tried before, and whatever Professor Kennedy's results may be, I think we may take it that cement is practically non-elastic. Professor Kerr seems to believe that no accuracy is required in testing cement, but I am afraid his way of testing cement would be of very little use. Mr. Sharp in his letter advocates the testing of cement with sand, instead of testing the cement only. Mr. Grawitz also speaks of it; and they both of them suggest a difficulty, and that is, to find a standard material to gauge with the cement. It may be desirable for a manufacturer of very great masses to know what would be the strength of the composition when he has used it; but the ordinary user of cement, who is going to make mortar of it, if he knows simply the strength of his cement he knows the strength that his material should have after it is finished, and, therefore, to test the cement ought to be sufficient for him to judge of the ultimate strength of his structure. And as long as you keep to the cement pure and simple you reduce your limits of error to one thing, whereas to put sand and other things with it to test it, why, you increase your range of error. Of course we can only all of us wish that we had a recognized Board to which all disputes of cement and building matters could be referred, and I am sure Professor Kennedy deserves great credit for suggesting it. I hope it will be carried out. Professor Lewis has made some very interesting experiments in respect to cement with the microscope. I have also tried to look at cement through a microscope, and I must say I have not met with the success that Professor Lewis has. I have practically come to grief with it. The only thing that I did discover with the microscope was about the non-setting power of the core. I need not say that the core has seemingly a certain amount of "set" in it, but if you look at it through the microscope you will always find that there are particles of fine cement round each granulation that of course set when the water is added, and this is the only thing I have yet discovered about cement by the microscope. With regard to the chemistry of cement to which Professor Lewis alluded, I regret that Mr. Heisch was prevented through indisposition from being present, as he would have explained the matter much better than I can. The

preliminary stages of manufacture result in a mechanical combination of the raw materials which by calcination resolves itself into a chemical one, the result being a double silicate of lime and alumina; any excess, therefore, of either material in the compound is unable to thoroughly amalgamate, and hence the blowing or otherwise faulty cement produced. The meeting I think has generally misunderstood my specification. I did intend that it should be taken as a complete specification, but, at the same time, that only certain clauses, more especially those relating to weight and fineness, should be adopted as thought desirable, my argument being that until a recognized manner of testing cement is adopted no very reliable results will be obtained. So far as the manipulation of cement is concerned, the only way in making concrete or mortar is to adopt machinery for the purpose; it is the only means of securing a uniform body in the compound, and if it is even not so good as the best hand-gauged, its regularity will render it superior. I have but one word more to say: it is with reference to the tests, to which Mr. Grawitz has alluded, made by the Metropolitan Board of Works. I think I am correct in stating that the new Specification, introduced by the Board in October last, applies to such works only as are carried out under the Board's own supervision, and that it does not in any way affect the regulations set out in the Metropolitan Building Act.



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St. James's, Bury St. Edmund's, Reredos. Architect, the late Sir G. Gilbert Scott, R.A.
Monkland Church, Reredos. Architect, G. E. Street, Esq., R.A.
Cowley Church. Architect, G. E. Street, Esq., R.A.
Chapel, Rhydd Court. Architect, R. Norman Shaw, Esq., R.A.
Christ Church, Bootle. Architects, Messrs. Slater & Carpenter.
Pakenham Church, Bury St. Edmund's. Architect, S. S. Teulon, Esq.
St. Stephen's Church, Hampstead, Decoration of Apse and Nave. Architect, S. S. Teulon, Esq.
West London Synagogue, Upper Berkeley Street, Tablets. Architects, Messrs. Davis and Emanuel.
St. David's Cathedral, large Panels, "The Crucifixion," &c. Architect, the late Sir G. Gilbert Scott, R.A.
Willesbourne Church, Reredos. Architect, Thomas Henry Wyatt, Esq., F.S.A.
Chapel, Rugby School, Reredos. Architect, William Butterfield, Esq.
Charter House School, Godalming, Reredos. Architect, P. C. Hardwick, Esq., F.S.A.
Babbacombe Church, Devonshire, Reredos. Architect, William Butterfield, Esq.
Alford Church, Chester, Panels for His Grace the Duke of Westminster, K.G.
Dundee Cathedral, Altar Panel. Architect, the late Sir G. Gilbert Scott, R.A.
St. Peter's Church, Leeds, Decoration of Chancel. Architect, G. E. Street, Esq., R.A.
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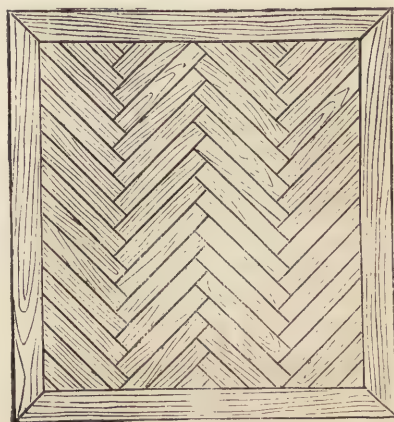
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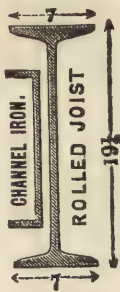
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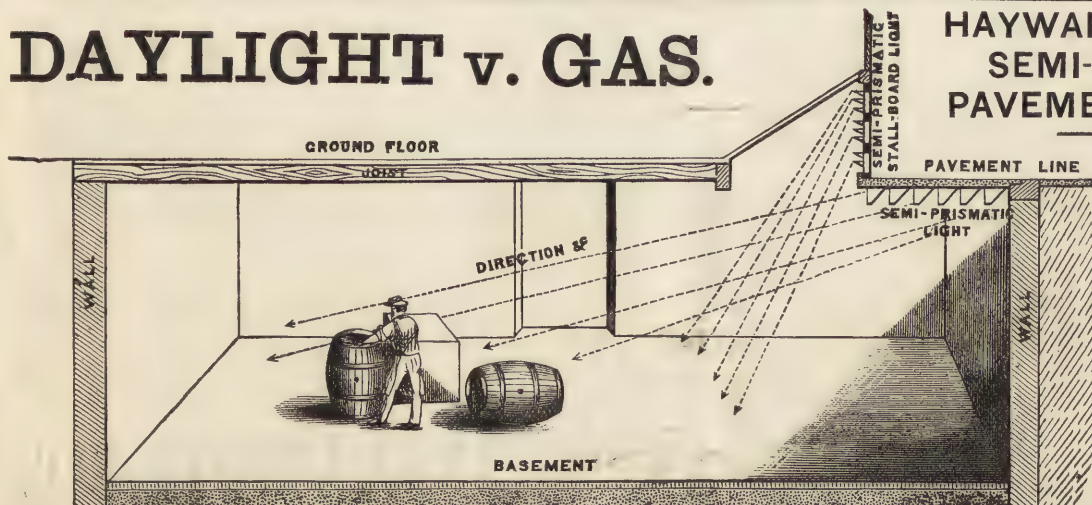
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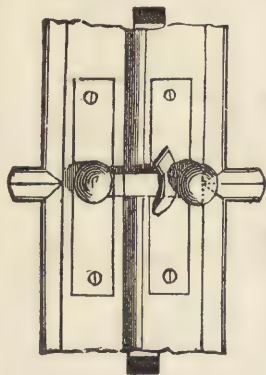
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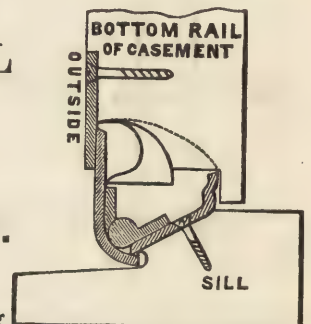
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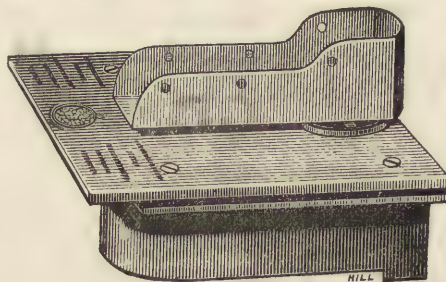
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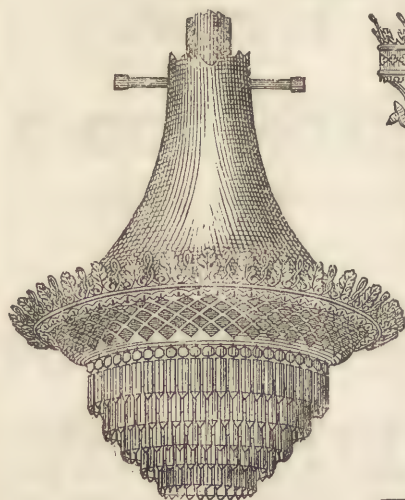
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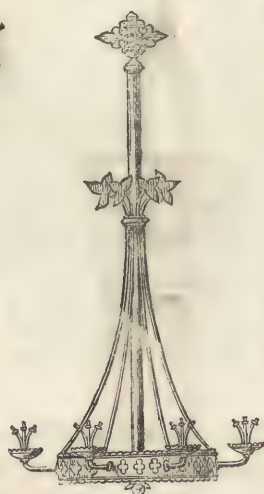
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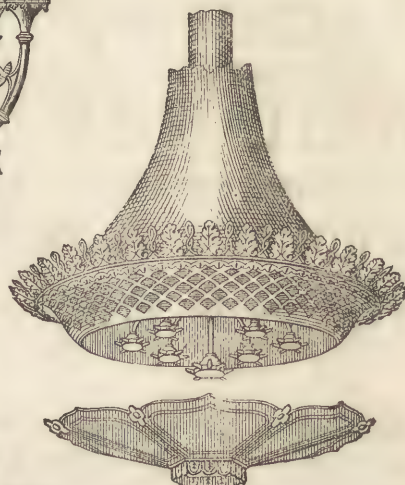
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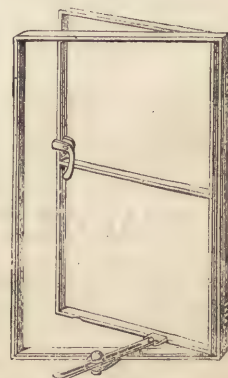
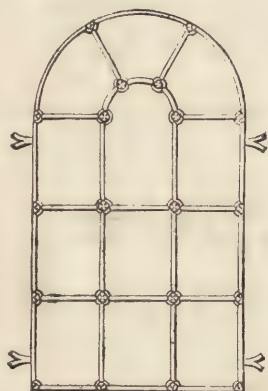
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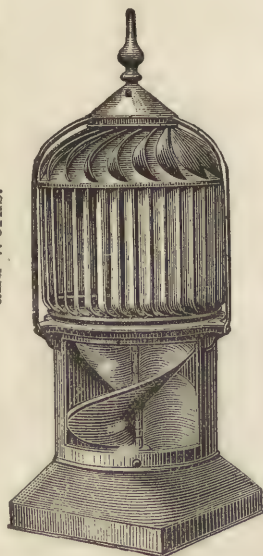
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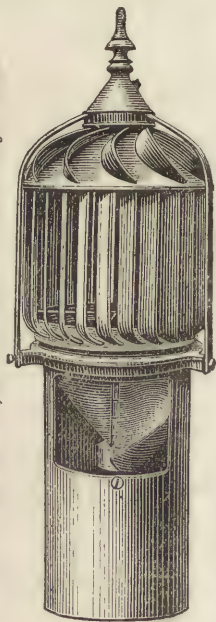
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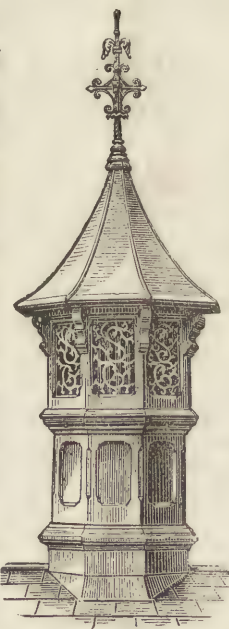
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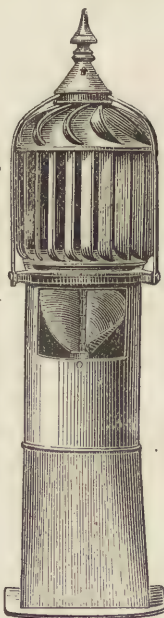
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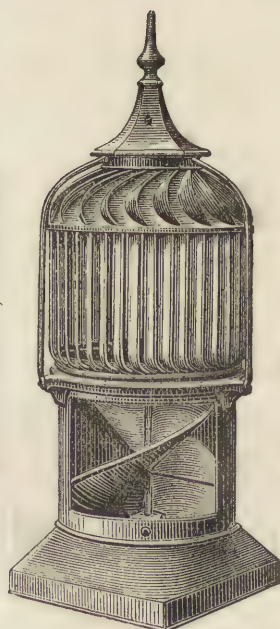
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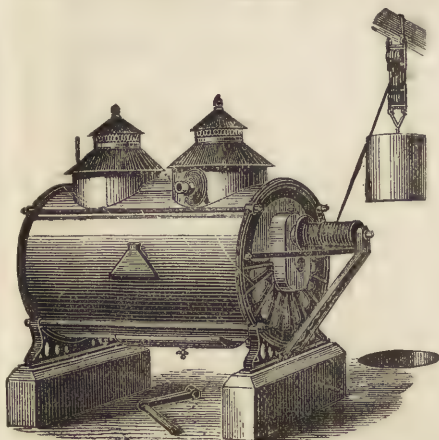
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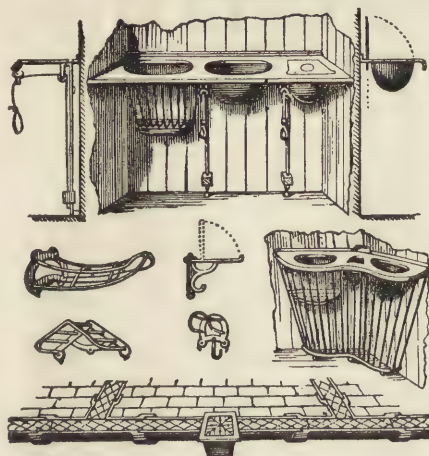
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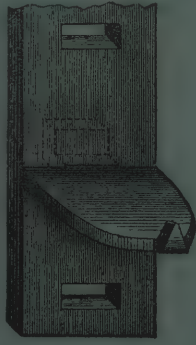
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GEO. T. ROBINSON, *Art Director.*

Two Chromo-lithographs illustrating this Paper will be issued to
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ERRATUM.

On p. 144, last line but one, for "*lumbar*," read "*dorsal*."



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No. 7.

TITLE OF PAPER.	AUTHOR'S NAME.	
I. Opening Address	John Whichcord, F.S.A., <i>President</i>	Dec. 1st, 1879
II. Frederick Pepys Cockerell: a Memorial Sketch . . . . .	.....	Dec. 15th.
III. Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S.	Jan. 12th, 1880
IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.
" Adjourned Discussion on ditto	Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> , Professor Kerr, <i>Fellow</i> , and others	Feb. 9th.
V. Portland Cement	Henry Faija, Assoc.M.Inst.C.E.	Feb. 23rd.
VI. The Polychromatic Decoration of various Buildings	John Pollard Seddon, <i>Fellow</i>	April 5th.

SESSIONAL MEETINGS: MONDAY EVENINGS.

1880	MARCH	. . . . .	8†	1880	MAY	. . . . .	3‡—24
	APRIL	. . . . .	5—19		JUNE	. . . . .	7§
† Special Meeting.				‡ Annual Meeting.			
§ Presentation of Royal Gold Medal.							

NOTICES of the PROCEEDINGS are published on the Thursday morning *following* each Sessional Meeting, and the current number of the TRANSACTIONS is published on the Thursday morning *preceding* each Sessional Meeting.

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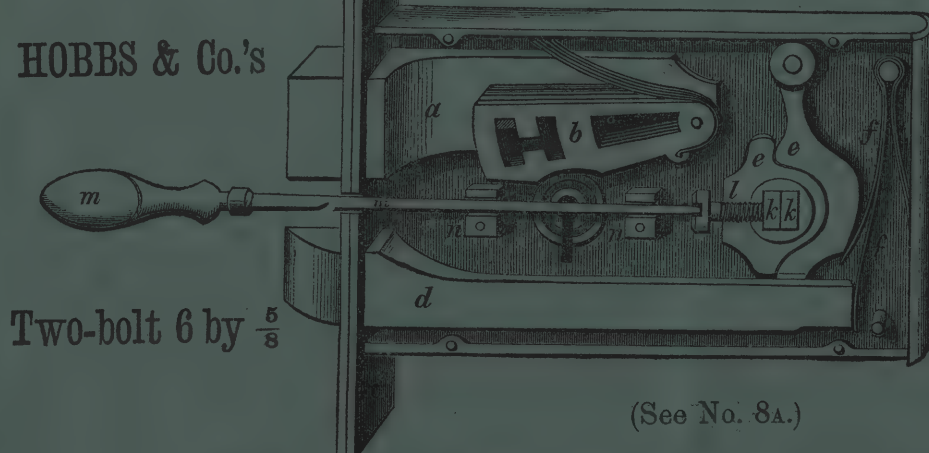
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VI. THE POLYCHROMATIC DECORATION OF VARIOUS BUILDINGS.

By JOHN POLLARD SEDDON, *Fellow*.

SO long as architecture was a living, original and progressive art, the use of colour was both universal and profuse in all countries and all climates. Nature likewise seems to abhor absence of colour, as she is said to do a vacuum. No sooner does the annual coat of whitewash render glaring the walls and roof of a Welsh cottage than she sets to work to convert it into a "harmony in greys" or some other delicate tints; and she soon mantles over with rich lichens and mosses the freshly-scarped side of a quarry or the garish slope of a railway cutting. The application of colour to architecture during the whole period to which I have referred, by every nation in succession, was simple, vigorous, judicious and, in fine, right; almost as certainly so as it is in each landscape, beast, bird or flower that we see around us.

But the Renaissance, as it was called, of the dead languages of art at the close of the 15th century in Italy, turned architecture into a science of copyism, a compilation by the learned, an amusement for the dilettanti. Then all principles as to the application of colour to buildings seemed, as it were, to evaporate. The practice of it became a matter of mere individual taste; guided, it is true, for some time, by artists of consummate talent, such as Raphael, his compeers and immediate successors. Afterwards, however, as art became corrupted, this department of it fell under the caprice which individual want of taste might dictate. The result now is that in Italy the colouring flaunted outside its villas is shocking to every refined eye; while in England, safety has been more wisely sought in ignominious flight, and negation of colour altogether has come to be accepted as the *ne plus ultra* of educated and refined taste. Yet, even down to the present day, in the far East, whither the Renaissance has hardly penetrated, and had happily but slight effect, the old healthy natural feeling for colour survives; and it may continue to do so until Manchester cotton goods, and the efforts of Europeans to teach the Orientals cockney villa building, succeed in effectually stifling it.

The contents of our Indian museums and South Kensington loan collections show us that the unsophisticated natural instinct of mankind for colour is just and true, and that the practice of it, unbiassed by false theory, can be and has been handed down from generation to generation with faultless accuracy. It is obvious, therefore, from the briefest survey of Nature and past art, that there must be some principles which could and should guide us, if we could only re-discover them. And the possibility of contributing, in any degree, to so desirable an end has been the main motive for my having brought this subject before you.

In consequence of the unfortunate perishability of polychromatic decorations, we know but very little as to what the artistically gifted nation of the Greeks thought and did with respect to it. We have but recently come to the conclusion that far from eschewing it, as our purist fathers fancied that they did, they in fact actually revelled in it. If we could but glean sufficient and reliable precedents from their works, we might save ourselves the trouble of endeavouring to concoct any theories of our own upon the subject, and content ourselves with accepting their practice as perfection, in the same manner as we recognize it to have been, so far as their aim extended, both in architecture and sculpture. It is perhaps, therefore, fortunate

that we have escaped becoming entangled in such leading strings in this department of art, considering how different the circumstances under which they worked were from our own. It certainly is so, if the crude tints, given in some published illustrations as representative of what has been discovered of the colours employed upon Greek buildings, had authority in fact. A glimpse has been obtained here and there upon a few marble fragments that analysts tell us was cobalt, and lithographers have straightway been set to work to give us pure cobalt with a vengeance, and thence it has been assumed that the Hellenic polychromy must have been what we feel we could not ourselves digest, and had therefore much better avoid; and so but a little knowledge has become a dangerous thing.

Perhaps the following extract from Professor Symonds's "Sketches in Greece and Italy" gives as good an idea as can now be obtained of what the Greek system of coloured decoration really was:—

"To realize by fancy the many coloured radiance of the temples and the rich dresses of the votaries, illuminated by the sharp light of a Greek sun, which deprives outline of shadow, and gives value to the faintest hue, would be impossible. All that we can know positively about the chromatic decoration of the Greeks is that whiteness, artificially subdued to the tone of ivory, prevailed throughout the stonework of the buildings; while blue and green, in distinct yet interwoven patterns, added richness to the fretwork and the sculpture of pediment and frieze. The sacramental robes of the worshippers accorded doubtless with the general harmony, wherein colour was subordinate to light, and light was toned to softness."

But time need not be lost in speculations as to what may have been the practice in classical times. We can assert in passing, without lengthened comment, that Egyptians,* Assyrians, Persepolitans, Indians and Chinese, all alike decked their buildings, without and within, with bright and yet harmonious colouring; and when we turn to the Eastern productions of the present day, we find, still universally, refinement and harmony both in the colours used and in the manner of combining and applying them. The evidences and remains that we possess of the polychromy of the Ancients, and of the Oriental world, may be taken as certain testimony of the sense held therein as to the absolute necessity of the employment of colour, as the proper completion of works of architecture, and also of the acknowledgment of its power.

What then, we may well ask, is that power? As an answer to this question, I venture to quote from some valuable notes on this subject, lent me some time since by Mr. Henry Conybeare, and to which I am also considerably indebted for several suggestions incorporated in this Paper:—

"Polychromy in architecture can either increase or diminish the apparent scale of an interior;

* Special attention may be called to some remarkable and beautiful decorative polychromy by means of inlays discovered in 1870 at Tel-el-Yahoudeh (the mound of the Jew) in Egypt. This is supposed to have been the site of the temple built by Onias in the time of Ptolemy Philometor, B.C. 160. The British Museum has a large and varied collection of specimens brought thence, well worthy of careful examination. They appear to have composed the decorative portions of a building which must have been sumptuous and elaborate beyond conception, the minutest detail of dresses, for instance, being given by coloured inlays of glass, glazed porcelain bedded into incised stone, tiles, &c. To quote from a record made at the time of the discovery the remains found were apparently those of a large hall paved with white alabaster slabs. "The walls were covered with a variety of encaustic bricks and tiles, many of the most beautiful workmanship, the hieroglyphics in some being inlaid in glass. The tiles are round, varying in size, colour and pattern. The capitals of the columns were inlaid with brilliantly coloured mosaics, and a pattern in mosaics ran round the cornice. Altogether it must have been a splendid apartment."

it can render it light or obscure ; it can alter its proportions or accentuate them ; it can produce the effect of distance or of approximation ; it can amuse or fatigue ; it can conceal defects or exaggerate them ; it is a fairy who is prodigal either of good or evil, but who is never neutral ; at her will she thickens columns or attenuates them ; she heightens pillars or lowers them ; she elevates the vaulted roof, or brings it down nearer to the eye ; she enlarges surfaces, or diminishes them ; charms or offends ; concentrates the thoughts upon one idea, or distracts and pre-occupies them without cause ; with a stroke of a brush she destroys a work that has been wisely conceived, yet at the same time she can convert the humblest edifice into a work of art full of attraction ; she can change the coldest and most naked interior into a pleasant place where one loves to dream, and of which one preserves an ineffaceable remembrance."

It is in fact an instrument of such tremendous power that, while one searches anxiously, and, as it were, lovingly for all traces of its use upon works of old, one is inclined to shudder when one sees it grasped by the hands of a contemporary. And why should we be able to trust so implicitly in the one case and yet be so faithless in the other ? Because the artists of old acted according to a system founded upon experience and common sense ; the decorator of to-day according to no system, but on experiment, and to please his individual taste. In the former, success could be predicted and in the latter failure, as the more than probable result.

The isolation of the several branches of art has destroyed the strength that they once possessed from combination, just as the fabled bundle of sticks became powerless, when separated, to resist the force which had failed to break it when united.

Polychromy, which absolutely requires complete understanding between the designer of the building and of the decorations, so that one mind, or at least minds of the same order, should direct and control both, has become entirely unsystematic and a matter of mere individual caprice. The consequence of which is that the public are quite at sea as to whom they ought to entrust work of this character. So long as it is a question of building of any importance, it is the usual custom to seek the assistance of members of the architectural profession, and they are then expected to find builders to execute their designs. But when it comes to the painted window to be inserted into the same building, or decorations to be applied, an architect is naively asked whom he would recommend for the purpose ; and should he reply, as would be but reasonable, with the advice that such work should be entrusted to himself, or some other discreet and learned member of his own profession, the advice would be received with incredulous amazement, and in nine cases out of ten not followed.

The existence of such a state of things, which is in no degree exaggerated, is of serious effect to our profession, and needs the utmost consideration ; but what is of far more importance, it is of vital interest to the public, as the result of such things now is simply disastrous, and destructive of their taste and good sense. Our cathedrals and churches throughout the country have by this means been turned into museums for the display of the most execrable parodies of art, which have produced colour blindness, and I might almost say atrophy of intellect in the nation at large.

It is but a few weeks since that a clerical friend of mine promised me, as a treat, the inspection of his church in the suburb of a large town, boasting that every window of it was filled with good painted glass. As I knew him to be a man of more than usual cultivation and refinement, I hoped, almost against expectation, that something better than ordinary would be shown me. Alas, on entering I could not help doubting the sanity of a congregation that could

sit constantly facing daubs of so wretched a description. The real truth is that people do not look at them in any fashion, not to say critically, but even observantly; otherwise they could not endure the glaring colours and grotesquely bad drawing that they would scout in the cheapest lithograph; and we need not travel far for examples, when our own glorious Westminster Abbey is disfigured in this manner, and its scale diminished by the colossal size of the figures in the modern windows in the clerestory.*

With regard to modern buildings, we all know and deplore the costly fiascos which are of constant occurrence, whenever anything out of the ordinary routine, and even within the ordinary routine, is attempted; when the office of the architect to decorate his own building, which he has designed to produce certain effects, is often usurped by men, untrained to know even the use and purport of architectural features, and who look upon his walls, as they would upon canvasses, as mere space whereon to indulge the wildest imaginations. Unfortunately architects, as a rule, are not credited by the world in general with being competent to undertake this branch of their art—dare I make such a suggestion, in this august assembly of the profession, that all architects are not so, and that there is some ground for this rather widely-spread opinion? At any rate I fear we must admit that we have not any definite and recognized system among us, by which we can ensure a right result, and that our practice is founded rather upon our own individual taste and fancies, which we have no right to impose upon the public as possessing indisputable authority.

Then as to our painters and sculptors, whose artistic powers are far greater than our own, and who have achieved world-wide reputations, it may seem bold on my part to deny that they are not fit to be entrusted with the decoration of buildings. Yet I do so emphatically. I fully believe that, if they would work in concert with architects, they would succeed. But, as a rule, they are not familiar with architectural principle; they practically, if not theoretically, despise it. They are intolerant of the necessary conditions and limitations of true decorative painting. They cannot use restraint as regards foreshortening, perspective and aerial effects. Their nearest attempts to what is wanted are but gigantic pictures which need to be enclosed with frames, and so framed off, as it were, and separated: made distinct from the buildings they are supposed to decorate. Where this has not been done they have resolved the walls appropriated to their work into empty space, and so far as their work has extended have ruined the buildings. The few attempts made by eminent painters in designing stained glass have been great failures, from Sir Joshua Reynolds downwards. In fact the pictures and statues of our noble English school of painters and sculptors are admirable so long as they are confined to their frames and their pedestals, but are an offence when intruded into buildings with which they have no necessary connection.

In the case of St. Paul's Cathedral and in other instances, decoration has been taken out of the hands of architects, to be handed over to painters, in order to carry out with certain modifications a sculptor's design, which I have no hesitation in pronouncing to be thoroughly unsuitable for the purpose. In other cases works of this character have been entrusted to decorators; and though the results may have a superficially correct effect, they are wholly destitute of artistic feeling, and can only be counted as fine opportunities spoilt. It would

* The old windows in the clerestory of the apse have the figures in them of the proper scale always adopted in the middle ages, viz., less than life size.

matter little or nothing to the public who the parties to be engaged on such work should be, so long as they are found to be competent. Whether architects now be so or not, I think it capable of proof that *they* only can become so, and that neither painters nor decorators without them ever can be. But I pass from these remarks, which I have felt called upon to make,—unpalatable though I know they must be to some,—to try to show the remedy for the evils I have been pointing out and deploring.

And where are we to seek it? Classical precedents being, as already pointed out, mainly conspicuous for their absence, we are almost compelled to fall back upon mediæval precedents, and fortunately we shall not have to seek in vain. We shall not be able to discover the names of any great masters to whom even the *chefs-d'œuvre* of the polychromy of the middle ages are due; for it is not occasionally, here and there only, that success was attained, while failure or uninteresting mediocrity was stamped upon the majority of the attempts made. All seemed alike excellent and in good taste. We can, it is true, discern various degrees of merit and sometimes of demerit in the manner of drawing the figures introduced into the general scheme of coloured decoration; but the scheme itself and the character of its treatment were invariably good and the colouring harmonious. We may roam through scores of out-of-the-way villages in Norfolk and find in them church after church filled with mutilated fragments of richly painted rood screens. All of these are exquisite in design, charming in colour and covered with most delicate and refined ornamentation. There is in the Institute Library a volume of highly finished tracings from drawings made in some of these churches by Mr. Wardell, presented at my request by the late Sir William Tite, which may be studied with advantage. There are also monographs by Mr. Winter of the fine screens in Randsworth and Barton Turf churches in Norfolk, in our collection, which convey a good idea of them. On the panels of these screens there are numerous painted figures of angels and saints, which are all good in general conception, and the draperies are ably drawn and designed in excellent style, while the heads, hands and feet vary much in point of merit. In some cases heads (as at Barton Turf) may be found quite rivalling, while differing from, the productions of the early Italian School; and yet the extremities of the limbs of the same figures are uncouth even to grotesqueness. This fact proves the existence of an admirable system, by means of which decoration of a high order could be carried out and good effects produced, mainly by common workmen at moderate cost and under ordinary circumstances—a great desideratum at the present day. We may see the results of a like system if we take up a set of Chinese plates, in which we shall find upon close examination that, although the general design, throughout the set, corresponds, the decorative effect being right in all, the drawing and finish of the separate details vary considerably; one or a few out of the whole number are noticeably superior to the rest. The obvious conclusion thence is that a master-hand set out the work, and that pupils or under-workmen completed the others from the pattern given them, and that some system has been conformed to, which has prevented any of the workers from travelling out of the right groove. That remnants of such a system in connection with coloured decorations still exist, may be inferred from a statement made by M. Didron, who relates that, happening to visit some church at Mount Athos, he saw the whole interior of its narthex decorated in an almost incredibly short space of time (some few hours) by a master painter, accompanied by several pupils, each armed with a different appliance. The master drew in the outlines

of the historical subject to be represented, his pupils followed, and in succession filled in with brushes, from pots of pigments of different colours, the portions of the several figures or of the background as evidently determined beforehand. All knew exactly what they had to do and did it, without waste of time in experiments. The result was, as may have been expected, conventional and stiff, yet the general effect was good and harmonious.

Several mural paintings of the twelfth century have been illustrated by the late M. Merrimée in his "Collection de Documents inédits sur l'histoire de France," and these indicate the system above referred to.

There are several churches in Norway which still retain, nearly intact, the whole of their original mediæval coloured decorations. These have been fully and well illustrated in a work by M. Mandelgren, a copy of which is, I believe, in the Institute Library. This is worthy of particular attention by all students of polychromy, and it is a mine of information besides upon the iconography of Christian art. It shows the system adopted in the middle ages, and its adaptation to buildings of quite a humble character, and that with a degree of completeness which it is almost hopeless to expect to find in any of the larger and more important buildings of Christendom, which have been more exposed to destructive agencies. There are, however, many scattered examples of polychromatic decorations in England and upon the Continent, now tolerably well known, which it would be tedious to enumerate. I shall refer only to a few in detail, as typical among them, and in order if possible to gather from them some idea of the system under which they were produced.

The principal object with which the simple coloured decorations of the early mediæval periods, known in England as Norman and Transitional, were applied, was in order to emphasize the constructive parts of a building. These, it must be remembered, were very simple in themselves, consisting of broad spaces, with few and bold but not deep mouldings. Breadth in colouring was therefore appropriate to this architecture. Projecting parts were accentuated by light warm tints, and hollows by dark, retiring and cooler ones. Stencilled borders were employed to throw up cornices, strings and vaulting ribs. The plain spaces of walling were made to appear solid and flat by decorations consisting of lines, suggesting but not directly imitating construction, together with other unobtrusive ornaments, such as diapering, &c., with panels enclosed with borders for occasional pictures or figures, almost equally simple and conventional in character.

The pigments employed in these early works were few and simple, and their medium merely size (that is, they were *tempera* paintings), and they could not fail to harmonize agreeably. The earth colours, red and yellow ochre, black and white, with a quiet toned slaty blue, formed the moderate but sufficiently comprehensive palette for the purpose required. The red mixed with black made chocolate, and with white formed rose; the yellow with black or with blue gave greens, and with white a creamy tint; then the black and blue mixed with white gave various greys. It is astonishing what variety can be obtained with these few simple colours and by judicious contrasts of warm with cool tints, and of dark with light. Mr. James Colling in his "Art Foliage," pleads for a far more extended scale of colour, and calls attention to the numerous shades intermediate between the primaries to be found in nature; but my advice is, to the student at any rate, to commence and be content with the simple system until complete mastery has been obtained over it. In fact, to follow the safe example set us by our mediæval

ancestors, of making sure of each step taken in advance in succession, rather than to adopt the lawless license introduced with the Renaissance, which needs genius and talent of the highest order, not always at command, to control it; and which has led our ordinary decorators into a slough of despond from which they are unable to extricate themselves—the multitude of illsorted and uncongenial colours with which they attempt to deal only serving to embarrass them.

Proceeding with our analysis of the system of polychromy of the middle ages, we find that as Gothic architecture developed in the thirteenth century, and in a truly marvellous manner, a corresponding change took place in the coloured decorations applied to buildings, in order to adapt it to their altered construction, their mouldings and other details. Every step in this course of progress was thoroughly consistent with common sense, and the result of profound judgment and observation, which seem to have been universal and shared by the whole body, and not either local or confined to individuals. The colouring was still in due subordination to the architecture, and the main object of its application was still in order to emphasize and enhance the effect of the construction. The greatly-deepened hollows and the far bolder projections of the mouldings of our Early-English, and the corresponding styles upon the Continent, obviously called for more vigour in their coloured decorations, for the purpose of giving each separate member of them its proper and appropriate value at a distance.

The introduction of richly painted glass into the windows, by the very fact that it diminished and modified the light, necessitated the use of more vivid and stronger colours, throughout the interiors of the buildings, in order to prevent the openings from appearing as isolated patches of powerful colour. Consequently the whole of the polychromatic treatment had to be raised up to an altogether higher key than had prevailed previously. Deeper and richer blues, which had been carefully avoided before, began to be employed, and gilding, found to be the appropriate contrast to blue, was almost needed to support its intensity. Then all the reds, the purples and the greens required to be increased in strength, in order to enable them to hold their own in such company, so that other colours than the simple earth colours and other mediums than in the tempera paintings were introduced into practice. Still, while the general effect was thus greatly enriched, strict harmony was carefully maintained throughout; and in order to prevent indistinctness and confusion, the heraldic principle of not allowing colours of one kind to be placed in juxtaposition with those of another, without the intervention of black, white or gold, was adhered to with excellent result. These more powerful materials and the traditional system of employing them enabled the decorative painters to deal with the more complicative perspectives of interiors as successfully as, though in some degree differently to, their predecessor's method with the simpler problem. The multiplication of shafts and members of the piers, and those of the arch mouldings and vaulting ribs demanded and received more vigorous application of colour, in order to accentuate and render distinct all the numerous portions of their several members of the construction. Nevertheless, it was even more necessary than before that great restraint should be used, and the decoration kept to a sternly conventional character. Otherwise, had the painters allowed themselves, or been allowed, to give rein to their fancies and imagination, and to indulge in naturalesque or picturesque representations, the utmost confusion would have been the inevitable result. The numerous small portions into which the wall space and spandrels of

vaulting, &c., had become subdivided, if covered with decorations which did not respect and even emphasize the fact of their being solid and flat, would have resolved themselves into separate, disconnected, ill-shaped pictures; and the whole interior would have become an intolerable jumble. The common sense and good taste of the mediæval painters prevented any such attempt on their part to overstep the proper limitations of their art, when employed to decorate the works of architecture. No thought of representing distance, aerial effects or perspective occurred to them; anything at all approaching the pictorial was, in the first place, clearly marked out and confined within borders, so as to appear as panels upon the wall space, and the painting was all kept strictly in one plane within these borders, to avoid making the panels appear, as they otherwise must, like holes in the wall. Such limitations and conditions, however, left ample scope for appropriate artistic treatment of the highest class, and it was only what was obviously contrary to common sense and injurious to the general effect that was eschewed.

The remains of coloured decoration in our own country are sadly fragmentary, though numerous, as may be seen by the long list of those given in the very admirable work on the *Decorative Painting of the Middle Ages*, by Mr. E. L. Blackburne, which is in the Institute Library. The third volume of the "*Vetusta Monumenta*," published by the Society of Antiquaries, contains a record and some illustrations of a most interesting and remarkable example of early polychromatic treatment of a twelfth-century building. This was a small church belonging to the Hospital of St. Mary Magdalen, on the hill near Winchester, unfortunately destroyed in 1788. The above-named illustrations and descriptions may be studied with advantage.

Many of our cathedrals, as Norwich, Rochester and Durham, retain some interesting remains of their former coloured decorations, and Canterbury possesses a unique chapel in its crypt, the interior of which is entirely covered with its early Norman paintings, in a state of nearly perfect preservation. In default of more complete specimens of coloured interiors extant in our own land, from which to gain a clear notion of their general effect, we are fortunate in being able to turn to the record of several that have been well described and minutely analysed by the late M. Viollet-le-Duc, in his valuable "*Dictionnaire de l'Architecture Française*." The series of specimens of chromatically-decorated buildings referred to by that author, as existing in France, commences with those of the simpler harmonies, and is continued with successively more and more elaborate ones; and thus it shows the practical working-out, under the ever-changing condition of the several mediæval styles, of the system of polychromy, of which I have endeavoured to explain the theory. The lower hall of the Keep of the Castle of Coucy is decorated in the simplest possible manner, with merely yellow and red ochre (brownish red), black, white and grey. Although the effect is scarcely more than that of a warm grissaille—even this combination is seen, in this example, to be capable of producing very varied effects. These earth colours, red and yellow, harmonize naturally; and patterns of yellow on the brown and red, or the reverse, when outlined with white or black, or with both, produce a delicate result, and which at the same time is clear and distinct. There are, it should be noted, elsewhere in this apartment, a few touches of green and vermillion, as in the capitals of the columns; but there is no blue, beyond the quiet bluish grey, previously mentioned as the nearest approach to blue used at that period.

At Coucy, the square-edged ribs of the vaulting have ornaments on the face radiating with the voussoirs, and running scrolls on their soffits. In one the ornament is dark yellow (composed of red and yellow ochre mixed); this is outlined by broad lines of chocolate (the red ochre and black mixed); with narrow lines of white within the darker one, and the groundwork is of yellow ochre with white spots upon it. Another is outlined with chocolate and white lines; the stalks are of slaty grey, and the ground is yellow ochre. A third has the ornament of deep reddish brown with chocolate and white outlines, and the ground yellow ochre.

The Refectory of the Commandery of the Knights Templars at Metz is a building of early thirteenth-century work; it consists of a hall composed of two divisions with a central row of columns. It is decorated in a simple manner without either blue or gold, and yet with a wonderfully bright and rich effect. The groundwork is white, and the ornamentation in yellow and red ochres, with a few rare touches of grey. Some panels upon which figures were painted have borders representing an architectural canopied framework; but it is noticeable that the treatment of the details is rigidly flat, and without any attempt to give relief to any portion. Such a class of decoration is capable of execution at a very small cost, and by ordinary workmen, which is a great desideratum. Being conceived upon right principles and a good system a satisfactory effect is certain to be produced, without fear of the mistakes happening, and the confusion occurring, which almost invariably result from unsystematic attempts at decoration, even by able artists.

These two examples will suffice to explain the general character of the early mediæval polychromatic decorations; and it will be obvious from them that variety and delicacy united with force can be obtained by the simplest means, if used upon right principles. The next to which I shall refer is of later date and more advanced character. The choir of the church of St. Nazaire at Carcassone has a remarkable treatment in colour, which is also elaborately described by M. Viollet-le-Duc. The windows which occupy nearly the whole of the walling space are filled with richly-tinted painted glass. For some reason, probably that of economy, gold was not employed and blue in consequence avoided. The problem had then to be met in a special manner, and the old simple harmony to be in the main adhered to. The vaulting was the principal field, besides the windows, left for decoration; the groundwork of its spandril spaces was left white and powdered with stencilled red stars, and each spandril bore upon it the figure of an angel clad in yellow drapery. The vaulting ribs, together with broad borders on each side of them, put to strengthen and emphasize these important features of the construction, were decorated with exceedingly rich, delicate and sparkling ornament, closely resembling that of Giotto's chapel at Assisi, in red and yellow with touches of dark colour; a bold broad band of red marked the line of the ridge of the vaulting, like the accentuation nature generally accords to the spine of an animal. This carried the eye forward to the easternmost triangular spandril next the apse, which was made the key-note of the whole, the groundwork being, in striking contrast to the white elsewhere, of deep brown colour, and the angels light upon it. In the centre of this spandril is a circular panel, containing the figure of Our Lord in majesty seated on a throne, clad in purple robes with green lining. His nimbus is gold, thrown up by a blue auriole behind, and the ground of the panel is bright red. This concentration of rich colouring in one portion of the composition, with the

restraint maintained throughout the rest, show a great degree of knowledge and skill in producing effect, and prove that the system to which the artist conformed was one that was by no means necessarily cramping to individual taste.

The principles sufficiently indicated by these simple examples were carefully observed even in the most elaborate works, and they tended to preserve sobriety in the midst of splendour. Would that we could recall, in imagination at least, the effect of some of the sumptuous buildings and their contents, which formed a galaxy of artistic glories around the shrine of the Confessor, in the Monastery of St. Peter at Westminster, and in the palace adjoining it. The only fear, if we could do so, would be that we should be setting ourselves under the tyranny of precedents that might extinguish originality as completely as those of Athens could do. And we might be in danger of canonizing Henry the Third as patron of the noblest art, and of forgetting that he lacked some other very necessary characteristics of royalty. First we should have his graceful Abbey itself as the casket, containing the brightest jewels; not, as now, reduced by solutions of shellac to one dead dull monotony of mud colour, but gleaming in polished Purbeck marble, as may be seen to have been the case by some portions which have been fortunately preserved in this condition in the north transept. This exquisitely refined material was the best that could be conceived, because of its tender neutral grey tint, to set off and enhance the beauty of the wondrous royal tombs, not to speak of the gorgeous shrine of the Confessor in their midst. Over and around them shone the pearly light of the painted windows, of the effect of which we can gain some idea from those still left in the apse clerestory, with figures of proper scale, and subdued and retiring but rich and jewel-like colouring. Their radiance fell upon monuments, such as those of Aymer de Valence, the Earl of Pembroke, of Crouchback, Earl of Lancaster, and Aveline, his Countess, which I select not as the finest, since doubtless they were excelled by the royal tombs, but as the best known from their prominent position and the best preserved. Their graceful forms, perfect proportions and exquisite architectural decoration are still patent, but as they have suffered from the universal modern mud-wash, I turn to Mr. Blackburne's description of their original decorations to convey some idea of their pristine beauty:—

"The effigy of the knight (Aymer de Valence) lies beneath an elevated canopy, profusely ornamented with painting and gilding. The grounds of the niches are painted blue and red in alternate order, diapered with small gold flowers: those of the trefoils are red, and those of the quatrefoils green, powdered with gold flowers. The whole of the fillets and hollows of the tracery, with the shafts and capitals, crocketing and finials are gilt."

St. Stephen's Chapel, the Painted Chamber, the greater part of the paintings in the Chapter House, and many other exquisite works in the same locality have perished, leaving only fragmentary evidences of the extreme delicacy and refinement of their execution. It would be tedious, however, to multiply examples or to enter into a minute description of the details of those already cited, although I strongly advise students to examine closely into them for themselves. Sufficient has been said to show how thoroughly mediæval polychromy was based upon system, and how that system was one evolved, with the refinement of good taste and perfect judgment, from a common-sense consideration of requirements.

It would be presumption on my part to attempt to describe or criticize the glorious works in polychromy of the middle ages, in the South of Europe. It would, moreover, be only

traversing ground already ably dealt with by Professor Lewis, in the exhaustive Paper published in our *TRANSACTIONS*;* and I would strongly advise those who desire to pursue this subject to consult what he has there written with respect to it.

Venice, Ravenna, Messina and Monreale are all names which call up to the mind visions of the most gorgeous colouring ever attempted in architecture. Of one of these (Ravenna) Professor Symonds remarks—

“There is nothing more beautiful in decorative art than the mosaics of such tiny buildings as the tomb of Galla Placidia or the chapel of the Bishop’s Palace. They are like jewelled and enamelled cases: not an inch of wall can be seen which is not covered with elaborate painting in the highest colours. Tall date palms spring from the floor with fruit and birds among their branches, and between them stand the pillars and apostles of the church. In the spandrels and lunettes above the arches, angels fly with extended wings: on every vacant place are scrolls and arabesques of foliage, birds and beasts, doves drinking from vases and peacocks spreading their gorgeous plumes; a maze of green and gold and blue. Overhead the vault is powdered with stars gleaming upon the deepest azure, and in the midst is set an aureole embracing the majestic head of Christ, or else the symbol of the sacred fish, or the hand of the Creator pointing from a cloud. In Galla Placidia’s tomb, these storied vaults spring above the sarcophagi of emperors and empresses, each lying in the place where he or she was laid more than twelve centuries ago. The light which struggles through the narrow windows serves to harmonize the brilliant hues and make a gorgeous gloom.”

Of the works of this class in the south, Mr. Lewis concludes, as I have done in regard to the nearly contemporary decorations in the North, that they were wrought instinctively “unknowing of the rules now binding us, and ignorant of the prism’s very being,” and yet with invariable success; and that in them the pictures “were made to form an integral part of the decoration;” and so long as this last named principle was adhered to, a good effect was always produced; but as this became lost sight of, the individual pictures were aggrandized at the expense of the general coup-d’œil. The paintings of the great masters of the Renaissance obliterated, instead of decorating, architecture, and the field so gained for display of their genius and transcendent powers was of course accepted as a boon. It is now, when we find the same sacrifice exacted without like compensation, that we realize the evil the system has done. It is, therefore, necessary to protest against buildings of importance being treated as an eminent artist suggested that the east end of one of our cathedrals should be, viz., painted black, that it might suit his picture, which he had not succeeded in making to suit its position in the cathedral.

As examples of Renaissance decoration of the best class, I may mention (illustrated in Gruner’s work) the bath-room of Cardinal Bibiena in the Vatican by Raphael, which, beautiful as it is, and as it might be expected to be from its authorship, yet bears out, as I think, all that I have advanced with regard to the work of the time. In the first place it is so evidently a copy of Pompeian decoration, that originality cannot be claimed for it. As such an adaptation it is an admirable one; the powerful black panels below, the lighter toned, but richer ones, with red ground above, and blue panel in the ceiling, all brought together by moderate admixture of gold, produces a good effect; but the pictures in the central panels are pictures, not decoration, and might with advantage be removed, and something less like holes in the wall substituted; and as to the minor details of the decoration they are as inane as

* See the *TRANSACTIONS*, Sess. 1862-63, p. 15.

most of the Pompeian paintings of the kind, and all copies of them are, even such as these. There is also, illustrated in the same work, a coned ceiling at Mantua, by Giulio Romano, a *tour de force* of the Renaissance, and remarkably striking, pretty and effective; but who can attempt to defend the perspective sham of the central panel? Then the landscape with the naturalesque trees and animals are positive absurdities considering their position. Truly, in my opinion, these great men of the age were setting but a sad example, too quickly and sadly followed, to the inevitable conclusion of a bad system, by the less gifted imitators of the school.

Classic architecture has been supposed to be more suitable for the display of decorative painting than Gothic, as affording broader surfaces and possessing simpler details; consequently painters have been too often suffered to run riot in them, and to work their own sweet will therein, totally ignoring all architectural proprieties. The work of genius is always welcome, but at the same time it may be misplaced; and misplaced it is when doubtful saints sprawl among clouds upon arch spandrils, or expose naked limbs in every vagary of foreshortening upon ceilings, as those of Rubens do, in the old banqueting hall—now the chapel—at Whitehall. One cannot but wish such paintings in respectable frames upon gallery walls, rather than turned upside down, and destroying all notion of the flatness of the surfaces they are supposed to decorate.

It has always seemed to me that classic architecture was quite as capable of the same common-sense treatment, as to coloured decoration, as mediæval, and that in fact it positively needs it more. Its wall surfaces being larger, and its constructive members fewer, solidity and flatness seem essential to it. Now, therefore, that it has become one of the vexed questions of the day, how our metropolitan cathedral should be decorated, if decorated at all, this particular point appears to deserve serious consideration.

The invariable architectural treatment of classical interiors, and that adopted by Sir Christopher Wren (which it is not my present purpose to dispute or defend), is to superpose upon the walling some architectural order, with columns and entablature, and possibly pedestal and attic, as the principal feature. Surely then, the first object with the colourist should be to emphasize this, and to maintain its unity and importance. Attention, however, it seems to me, is generally given to the manner of variously enriching alike the several members of this order, and of the walling with its arches. The frieze between the cornice and architrave has thus a treatment differing from and contrasting with their's, the result of which is that the part of the composition (the order) which should be broad and united, and stand out from the groundwork, is cut up and subdivided.

In proof that Italian architecture is capable of good treatment upon a simple system, I have been struck with some studies by the late Mr. Stephens, and with one by Mr. Stannus, in which he has followed Mr. Stephens's treatment. An extremely rich effect has been gained in these by the use of merely toned black and white and gold in ceilings, with quiet richness in the walls, and greater strength of colour in the dados below them. As I believe there is question as to how the apartment in which we are assembled should be decorated, I venture to suggest that this would be a better type to follow than the strange combination of washes of raspberry jam and other ambitious but not always successful tints, which are the results of many modern unsystematic experiments.

In the two drawings,* which I prepared some time since at the request of the Provost and Fellows of Queen's College, Oxford, for the decoration of their Chapel, I had two problems to solve. First, the method to be adopted in case the present exceedingly dark painted windows were retained; and second, an alternative treatment, supposing those windows removed to the library of the college, and lighter ones substituted. As regards the former, I proposed that the walling should be lined with very light coloured marble, to reflect all the light possible, and to contrast with the glass; and upon this groundwork to make the order in dark marble, that it might stand out distinctly as the principal feature. In the latter case the glass was to be kept as brilliant as it could be, the wall-work in dark marble, as a background to the order; the order itself again being in light material, such as the Mexican onyx. The second method is the one that I should certainly prefer, although I notice that constantly the order is made the darker in modern practice. If colour is to accentuate form, the column and entablature, which are themselves projections from the wall, ought to be the lighter according to my judgment.

I have, in the foregoing part of my Paper, treated coloured decoration as generally applied to the interior of buildings. I wish, however, to make a few remarks upon it in connection with their exterior, and that in reference to what is possible and desirable at the present day. I will not attempt to fortify my position again by adducing ancient precedents, for as the brilliant hues have all faded from the Greek temples and from cathedral fronts, many of which we are assured were equally richly painted, we might well hesitate to follow examples which appear to have been so futile in point of durability. Our external polychromy as a rule must be in the materials of the construction. As a grain of practice is said to be worth an ounce of theory, I may refer to an attempt of my own in this direction for a terrace at Aberystwith. I had at my command admirable rich red bricks from Cardiff, black ones from Staffordshire and buff ones from Ruabon, with yellowish and bluish grey freestones. I used the red as groundwork with black for decoration for the ground storey; then next above the red with buff as decoration, and lastly buff as groundwork and red as decoration at the top, but emphasizing the shadows of the cornice and strings by the use of the black again. By this treatment the strongest colour is at the bottom, and is gradually lightened upwards. Facing westward, as this terrace does, the sun strikes it at the time when the parade before it is most occupied and produces a brilliant effect, preferable I fancy to the prevalent dirty paste colour of most of our seaside resorts.

Should the desire for external colours extend, as may be hoped from many creditable attempts recently made at the west end of London and in Belgravia, it would be well to consider the subject of materials fit for permanent polychromatic decoration; and in conclusion I shall make a few remarks thereon. The regret with which you have doubtless heard me refer to the faded glories of classical and mediæval polychromy, is in itself almost condemnation sufficient of many of the processes now employed; while the eloquent description I have quoted of the still fresh and lustrous colouring of Ravenna, and others from the same author, of exquisitely rich interiors in Sicily, seem to commend, as distinctly for our use, the more permanent work in mosaic. But we are often told that

* Portions of these water-colour drawings are reproduced in Plates I. and II.

mosaic is necessarily costly, and that the effect is peculiar and suited rather to southern climes than to our own. I think that both these ideas are erroneous and based upon the supposition that we must accurately copy the exact method adopted by the Ancients in the application of this material: that we must use it only in the minute and regular-shaped cubes we find in old examples. Doubtless we cannot do better than follow these when engaged upon similar elaborate works, but I advocate a far broader treatment for ordinary decoration. To my mind the employment of equal-sized rectangular cubes produces a disagreeable spotty effect, and sometimes even a comic one, when they are coursed in regular rows up and down faces and limbs. Whereas by using the material in irregular forms and irregularly, this unpleasant appearance can be avoided. Granting, however, that the plain wall surfaces and even the vaulting spandrils can be appropriately and permanently decorated with mosaic (for curved planes are as easily plated with it as flat ones) there are still the moulded or other constructive members to deal with, and for which we seem to need a corresponding material. I cannot but fancy that this is to be found in stoneware or other ceramics. At present, if we use a marble shaft we have nothing for the bases and capitals to be used in connection with it, except marble, which does not lend itself well to mouldings and certainly not to carving; whereas, in clay, modelling of any class is easy and colour is applicable to it before it is burnt. I have constructed a chancel arch with this material, and was satisfied with the result, and I have also used it in connection with mosaic in the pulpit of a church. Tiles and painted porcelain are other materials to which attention has been already directed, and in which much has been, and more might be, satisfactorily executed. Painted tapestry also has been recently introduced and appears to me to be capable of good artistic tone, and to be a medium for the application of good art in a fairly permanent manner. In fact we have but to create a demand for architectural decoration, and to render ourselves competent to design and direct it; and further to do our best to train or induce artists to learn its requirements and conform to its conditions, and I doubt not we shall find modern science and invention able to supply us with ample facilities and materials for the purpose. I would, however, rather conclude, as I began, by advising students in decoration to be content with what is simple and to aim at what is true—to work upon the system which has produced such excellent results in so many ages, and which once mastered will admit of all the variety that their matured imagination and fancy may dictate to them. This done, they may well pass on, as Mr. Colling has advised, to imitate the subtler hues and richer combinations of colour found in the wonderful works of nature, and which seem the most gracious, if not the most utilitarian, of the manifold gifts of God.



THE DISCUSSION.

FRANCIS C. PENROSE, M.A., *Past Vice-President*.—I have heard Mr. Seddon's Paper this evening with much pleasure; it treats the question of colour decoration admirably and with most reasonable views. I do not mean but that on some subordinate matters I cannot go with him in exactly parallel lines, but without serious deviation I go in the same general direction. I quite agreed with him when in the earlier part of the Paper he referred to the necessity of employing architects for the decoration of our public and private buildings. Of course there are many cases (small and unimportant works for example) which the architect need not be called upon to superintend; but in anything important, such as the large rooms, halls and windows of houses—these are eminently worth the attention of the architect, and in public buildings, whether civil or ecclesiastical, I believe that no one else can properly interpret what is to be done. There is room for the painter and decorator to work in concert with him, but they should not over-ride his work without any consideration, as they are apt to do. In the matter of St. Paul's Cathedral I feel that I am at present unable to speak in detail, but I hope the time will come when the whole of the proposal will have been sufficiently matured to be laid before the Institute. I have brought here some designs which were made by me a good many years ago while the thing was, as I supposed, in train to be done, but difficulties have come since then to which I need not now refer. They are studies made chiefly with a view to preparing myself for the general designs, and to enable me to co-operate with the artists who might have the execution of that work, and they will enable me perhaps to speak to a few details on which I either exactly agree or do not agree with Mr. Seddon. With regard to the cinque-cento artists, I think they were on the right road and several of them executed the best works of decoration which have been done, leaving out of the question the few remains of antique decoration of which we have some relics, and eminently those of Ravenna, which Mr. Seddon has adduced. But some of those artists, for instance Raphael and Gaudenzio Ferrari, were thoroughly right in all they did; the great break-down of the later classical decoration, which entailed such works as those of Rubens and others who followed in the same school and in that of Bernini, arose from the extraordinary and overpowering strength of Michael Angelo, whose great works induced the desire on the part of those who could not wield his weapons to imitate him. In his master-work of the Sistine Chapel there is no collision between the architecture and the painting, because the architecture was entirely and purposely plain. There is not a moulding, there are nothing but broad surfaces. Therefore it is mainly a frame for the exhibition of his master-pieces, which are in my opinion the finest works of art that have ever been executed excepting those of Phidias. Michael Angelo and Correggio were the two great minds whose example misled their followers. Michael Angelo I think in his own style was always right, but was incapable of being imitated by less powerful artists; Correggio in his decorative works was very seldom right. At Parma we see a few minor things well done, but generally he has spoilt the buildings he has attempted to decorate. Those two great artists, I consider, led up to the fanciful and absurd works of the century following their date, by which many classical buildings were woefully maltreated. Again I do not quite agree with Mr. Seddon as to the very great

success of the thirteenth-century Gothic decoration. I consider that the remains which we have of the twelfth century are much to be preferred. In the thirteenth century wherever the work has been carried to its fullest extent I must say I think the decoration is very liable to be overdone; and I would quote as my culminating example—not that it is an authentic example of mediæval work, yet it has been carefully carried out with a view to represent genuine thirteenth-century work—the Sainte Chapelle at Paris, which I think is painfully overdone. I will venture to give you the impression it produced upon me. I am not without love for coloured decoration and a good deal of it, and the first time I saw that work I found much to admire, but the pavement was not then finished; it was a mere plain grey concrete or preparation for what was to come, and by occasionally looking down at the floor I could then enjoy and appreciate the very beautiful treatment which covered every inch of the rest of the chapel, ceiling, walls and windows. The second time I saw that work the pavement was elaborately coloured; there was then no repose in any part, and I felt that the sooner I got out of the place the better. In the French cathedrals one often finds that a chapel, perhaps, has been recently painted in rich colour, and it always appears to me to mar the simplicity and beauty of the old Gothic. I should say that the real mediæval work, unless it was from the beginning very much toned down below what these extremely careful and painstaking French artists have done, must have had the same overdrawn effect. With the few exceptions pointed out, I think I agree with Mr. Seddon entirely. I will, however, take this opportunity to call attention to a point, which the extremely beautiful skins of birds placed on the table have suggested to my mind, in connection with those two small and exquisitely beautiful works which Mr. Seddon named: the chapel in the palace and the tomb of Galla Placidia at Ravenna. Those two monuments, elaborated over every part of their surface, are extremely small; and I think a difference is to be drawn between a small work which may be treated as a jewel and a large one which ought to be treated with very much more reserve. Where there is rich and elaborate decoration, a large portion should be kept quiet in white or grey properly toned, or in subdued colour of some kind.

ALFRED TYLOR, F.G.S.—Mr. Seddon was kind enough to listen to a Paper I read, on the 23rd March, on the ornamentation of animals, birds and butterflies; and I have brought a few explanatory diagrams here with the idea that I could tell you the general laws of decoration I find to prevail in the animal kingdom. I began my Paper, at the Anthropological Institute, from the architectural point of view, and used the word *emphasis* particularly, as expressing an enlargement or development of function, and argued that decoration and function should always go together. Mr. Seddon kindly lent me some drawings to prove that *emphasis* was a real thing, and was the key to the laws which govern both Greek and Gothic architecture. Then I had to look at the two great divisions of the animal kingdom, the vertebrata and invertebrata, to see how far *emphasis* prevailed. As an illustration of the vertebral division, the skin of a leopard or a tiger forms the best diagram. I treated the spine as the great function of the vertebral kingdom, because every animal in that kingdom has a vertebral column, as its most important part; the darkest spots or decoration of these animals are placed about the central line distinctly marking the vertebral column. The number of cervical vertebræ (seven) are imitated in the markings of the tiger skin and the ~~lumber~~ vertebræ by twenty markings. Each vertebra has a line imitating a rib, and we may call this

dorsal

the axial system of decoration. When you observe the embryo of any vertebral animal—the corpuscles first range themselves in a long line marking out the spine; *that* we may call the principal and upper axis of the animal. Then there are the four minor axes thrown off, marking the position of the four limbs. The colouring and the spots are arranged on each side nearly symmetrically along the principal axis. Then there are sets of spots around the sub-axes, and this is not only true of this particular species, but generally of the whole of the vertebral kingdom; the spots being changed for lines or colour of hair, or muscular development, according to the function to be emphasized. The zebra exhibits series of stripes arranged around the upper or principal axis, around the four sub-axes, the limbs, and around the neck, also around the eyes and ears; there are stripes or rings of dark colour marking the position of nerves, and these lines or stripes radiate from these to the line over the spine. It has been said, I believe by Mr. Ruskin, that he had found no definite law of colouring in nature, but my inquiries have led me to a contrary opinion. I referred in my lecture to the reptilia. Applying your own word *emphasis*, I state that the serpent is a sort of moving backbone, and the principal function of the animal is emphasized in the decoration. On the neck or head of the snake there are only the simple vertebræ, but as you get to the false rib below these you see that the rib also is imitated. Then with regard to the invertebrata, take a specimen of one of the Murex family; all the invertebrate grow by borders—not one has an axial decoration. Each mollusk throws out a piece of new border from time to time, and these great processes are part of the borders and are analogous to the horns of the deer, which grow only at a particular period of the year; after this the animal adds another piece of border to its mantle not so pronounced in form or colour. The prominent spines are coloured highly in the direction of their growth and tipped to contrast them with the flatter parts of the shell. I call this decoration of the invertebrata “marginal” to distinguish it from the axial. There were several eminent naturalists present when my Paper was read at the Anthropological Institute; they were acquainted with the specific forms of 20,000 or 30,000 known species, and no one found an exception to the law I deduced, that every invertebrate grows by border, and its decoration is, distinctly, border or marginate. You see how beautifully the colour has been added, just as you gild the spires and other prominent portions of a building. All the invertebrata have some kind of border ornament. The spots which appear in the Trigonia are projections which are all functional and now they have become ornamental, showing the close connection between function and ornament in the animal kingdom. The butterflies and birds are intermediate. The costa is the main rib which carries the main wing; it springs at the thorax and in every butterfly this is strengthened by colouring or by nervures. In every butterfly there are two or three nervures parallel to the principal, to give emphasis to this part of the butterfly. You have other nervures proceeding to the border. You see how exactly the decoration comes in relation to the nervures. The spots which are the ornaments are generally between the nervures, and instead of being by chance they are placed really according to the most rigorous law of emphasis. The decoration of a panther was a simple thing; there was only one piece to decorate. But when you see how small the body and how large are the wings of the butterfly, it is evident it would have been useless to have expended all the decoration on one little bit—the central but not the principal function. The animal has

no vertebral columns although it has nerves, and therefore we have a sort of intermediate between axial and "border decoration," as I have called it. There is a good deal to be learnt from correlating art-æsthetics and natural æsthetics. I believe the best bird I am able to exhibit to-night is the peacock, and the decorations of the wings of birds have the same general features as the butterfly. In a bird the radius and ulna come up to a certain point of the upper margin of the wing, where the five fingers are arranged to hold the pinion feathers. I can only give you a very brief outline. Here is an English jay, and another of the Australian species. The middle rib of the feather is decked out with white in one bird, and with black in the other; this is just what an artist would do, he always likes white or black to separate colours. The change can now serve no particular purpose, except that of decoration. You all know the theory about sexual selection, but when you examine the form and colour of every particular bird, you will find a very general law underlying, and that is the law of emphasis. All beautiful shells are entirely covered with a thick epidermis when alive, and many of their inhabitants have no distinction of sex, and yet they are as beautifully coloured as any birds, and I think that that very much militates against the idea that colour is merely a sexual affair. I believe that ornament was intended to express function, and difference of colour or ornament to imply difference of function, and that you never have function without emphasis, or emphasis without function. Just as the hills in a landscape are sometimes tipped with gold at sunset, the tips of ears or tails, or edges, or prominent parts of animals, and also parts of flowers, are often tipped, or differently coloured. In the peacock a small spot near the neck appears surrounded with a copper-colour border, near the crest or neck. Further down the back there is a series of larger spots of the same colour, with fringes added, passing on to the end of the tail. These spots, when the tail of the peacock is expanded, form a kind of glory round the head or body of the bird. This is a most important feature, and is a key to artistic decoration. Every feather is beautiful by itself, and also is a beautiful feature in the whole bird. All the feathers have a local ornamentation, but they have also a general ornamentation, without which æsthetic effect is impossible. Every spot, or stripe, or patch of colour must have a local meaning and a general adaptation. The Moorish Alhambric decoration looks very well on a wall or roof, if the surface is carved all over so as to give a constant light and shade, and afford a pretext or rationale for the variety of colour placed on the parts, and this was carried out by the Moors. But you cannot put variety of colour on a flat surface, for then it has no meaning. The Alhambric colours and decoration, placed on a flat plaster wall or ceiling, would look very badly. In the same way good peacock decoration must be a series of overlapping feathers, executed in very low bas-relief, as in the bird. When the same spots, plumes and colours are placed on a flat wall, not in their order, the good effect of colour is almost lost; that is, the effect on the peacock, as in most other birds, is really produced by general design, and by the play of colour caused by the overlapping edges of feathers of most beautiful shapes. This accords with expression in the human face. The spots have some application to a general design as well as of local beauty. The play of form is lost when the surface is flat, and when there is no general purpose in the design. No trick of colouring can produce a great impression when copies of feathers only from a peacock's tail are placed on a flat surface, such as the wall of a room, or when they are grouped without support from the dado, cornice, ceiling, &c. In modern

houses the dado, cornice and central ceiling plaster ornament are almost the only parts that, when decorated, look really well, simply because there are means of putting variety of colour appropriately on a sculptured surface. A uniform surface seems to require a uniform colour. Pictures, of course, have a meaning of their own, and they must be considered as quite apart from mere decoration, which is purely a matter to emphasize function. The advantage of low bas-relief is that colour can be applied in divisions, as in Chinese enamels. The same rules apply to all copies from the animal kingdom. Every ornament in Nature is in accordance with the function it emphasizes, and so if the same ornamentation is transferred to a different function it must be wrong. The architect ought to be his own art-decorator, and must arrange his designs so as not to make quite a servile copy from Nature. He must, if he attempts natural objects, make each feather, each shell, or each insect stand out from the flat in relief, and have its local value, and yet be part of the general decoration of the hall, or room or building, and then he may use as bright and as varied colours as are found in Nature, in the peacock or pheasant or humming bird. He must not use axial decoration when only marginate decoration is appropriate or the reverse. He must not put a series of overlapping fringes of feathers on flat walls without support from the other parts, for that is contrary to the law of emphasis, which strictly requires that function and ornamentation shall go together, and he must in some measure regard symmetry. In Nature unsymmetrical feathers are arranged symmetrically, a perfect harmony of form and colour is produced. I have alluded to Alhambric decoration, but will further mention that an architect of Granada has designed a complete suite of furniture in the Moorish style to suit the decoration of the Alhambra. This was so successful that the Spanish Government employed this architect to furnish the Alcazar at Seville. This is the only palace I have visited where the formation of the building, the structural decoration, and the application of colours to buildings and furniture is all in harmony. It has cost less than other furniture of any other palace in proportion, and differs in this point, that where in most palaces all particular pieces of furniture and ornament are most beautiful, yet they have no general bearing on the whole, and do not perfectly harmonize, and therefore do not produce their full effect, as harmony is absolutely necessary to a true æsthetic effect. This instance proves that the architect who makes the first sketch should bear in mind the final decoration. Of course the latter need not be worked out in full detail. No doubt when the vertebræ and the limbs of the pheasant or peacock are well developed in the embryo, the future brilliant tail is only indicated by a few apparently colourless threads; but no one can doubt that the feathers, which are to form a radiating and circular glory round the head and body of the bird, are contemplated in the design of the complete bird at a very early embryonic stage. And further, it is the architect who must provide not only the structural features to admit of appropriate ornamentation, but he must see them properly carried out under his own direction before he can be said to have properly completed his work. I am very glad that a gentleman, so well acquainted with the laws of form and structure as Mr. Seddon, should enlarge on the importance of colorization and decoration. Function and decoration ought to go together in architecture as in the animal kingdom. I have to acknowledge a debt that naturalists owe to architects: I have applied the architectural law of emphasis to Natural History, and hope that Natural History will return the application by helping architecture, as far as decoration is concerned.

EDWIN NASH, *Fellow*.—I will just allude to a capital illustration of the difference between the pictorial method of treating painted glass in windows, and the architectonic method, as spoken of in the lecture. If you stand in the middle of the nave of Cologne Cathedral, and view the long range of windows on the north side, you will see that they are filled with mediæval glass; if you then turn to the south and view the Munich glass with which the windows there are filled—both the one and the other being most excellent of each kind—you can then put to the test the architectonic effect. No architect can but come to the conclusion that the work on the north side is, for architectural purposes, infinitely superior to the beautiful pictures that are on the south; and I think that no more ready illustration of the matter can be found than this at Cologne.

FRANCIS C. PENROSE, M.A., *Past Vice-President*.—Allow me to point out that there is a very material difference in those opposite windows. The north windows are executed on the old mosaic principle, and the new windows are painted very much in enamel. The two, therefore, do not transmit the light in the same manner. I entirely agree as to the superiority of the older windows in this particular case, but for such a comparison the painter's windows should be taken from St. Gudule at Brussels, or the Herkenrode windows now in the apse of Lichfield Cathedral.

J. D. CRACE.—I cannot quite agree with all the observations of Mr. Seddon, but with many of them I do. I am very glad to offer my testimony to the satisfactory effect of the mosaic pavements in the crypt of St. Paul's, which I had an opportunity of seeing only a few weeks since, and of which I see Mr. Penrose's designs here.

THE PRESIDENT.—The subject of Mr. Seddon's Paper is one in which I took great interest in my juvenile days—as many as thirty-two years ago I find—when I myself ventured to read a Paper thereon at the Institute, and in which, speaking from memory, the opinions I ventured to formulate were not very far different from those that have been pointed out by Mr. Seddon, involving as they do some considerable difficulty in describing the system upon which the ancient schools regarded the use of colour, and at the same time the more distinct manner in which the systems were used during the different periods of the mediæval period. I think we have been extremely happy to-night, not only in the Paper which has been read, but also in the very beautiful drawings by which it is illustrated—drawings unusually rich both in selection and in manipulation. Moreover, in addition to the architectural character of the discussion, we have had the advantage of the communication made by Mr. Tylor—which is, I think, of very great interest to us, and of very considerable value. I venture, without further remarks, to offer our cordial thanks to Mr. Seddon for his Paper, as well as to Mr. Penrose, Mr. Lewis and Mr. Tylor for their excellent contributions in illustration of it.



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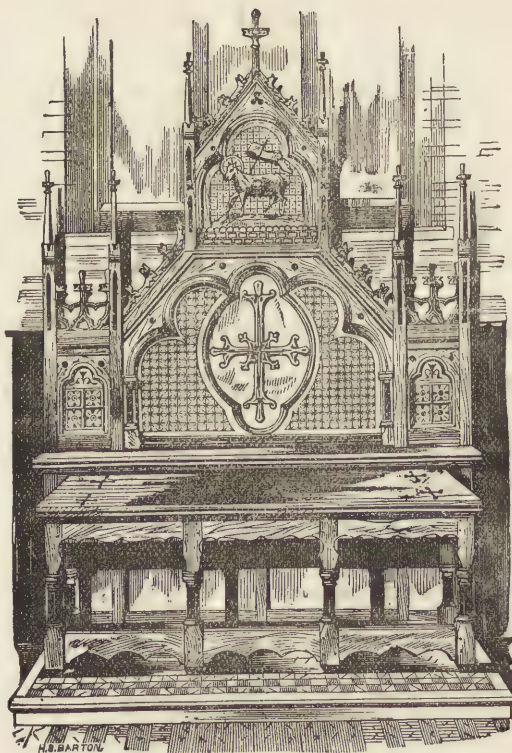
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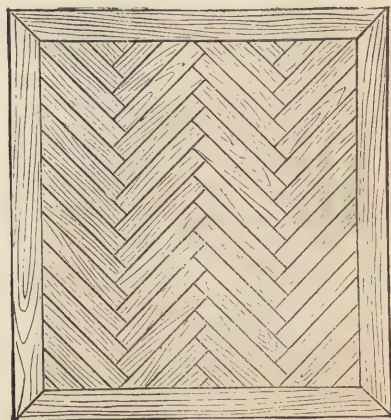
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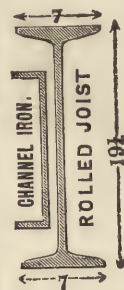
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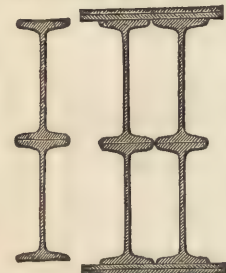
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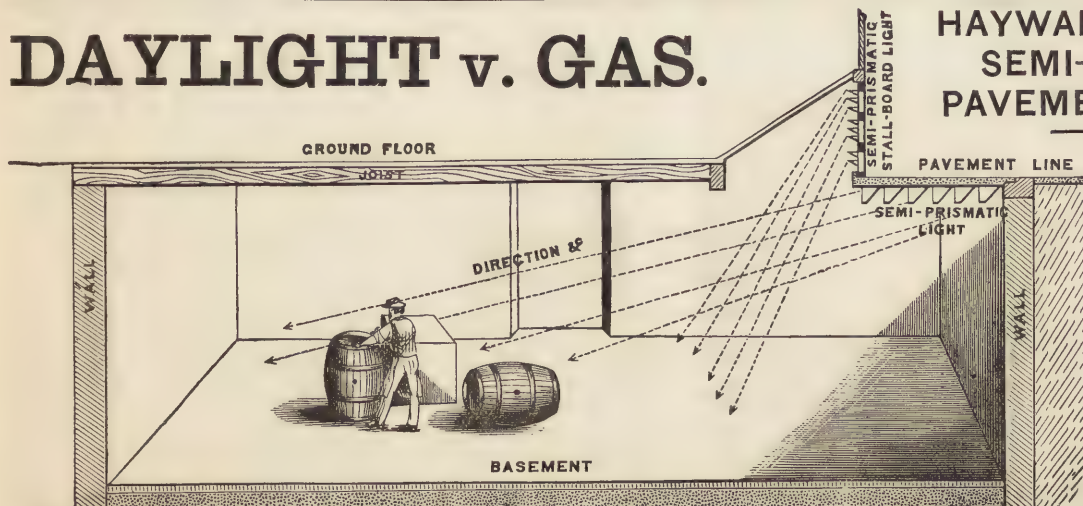
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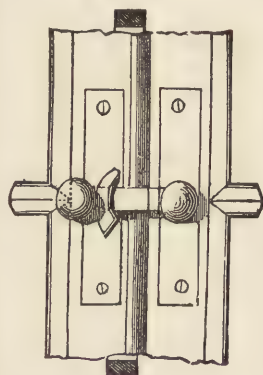
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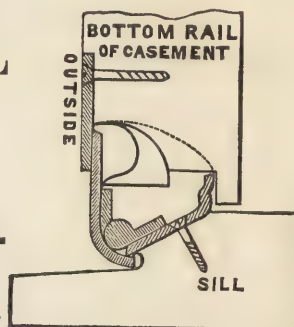
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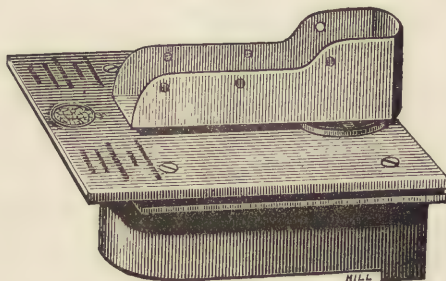
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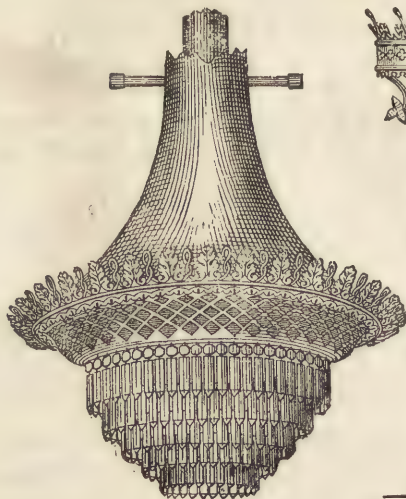
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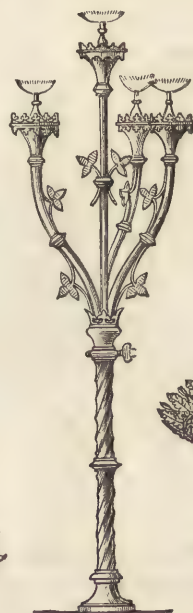
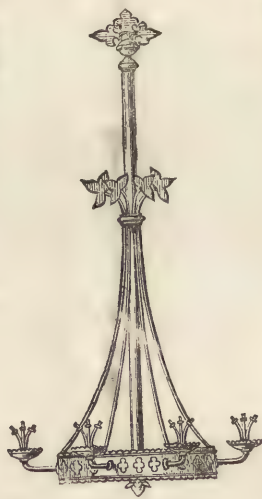
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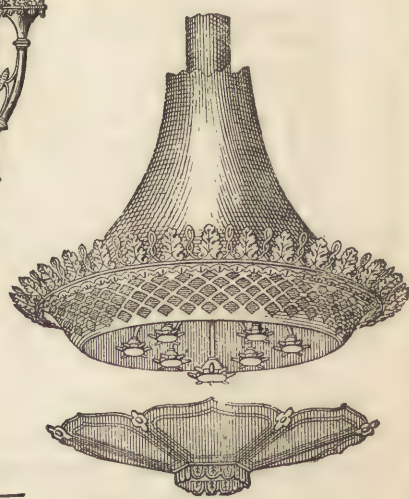
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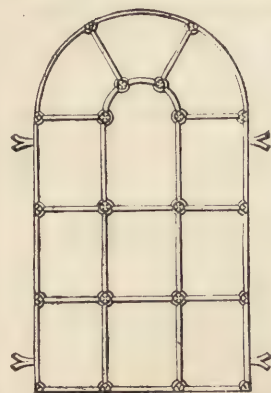
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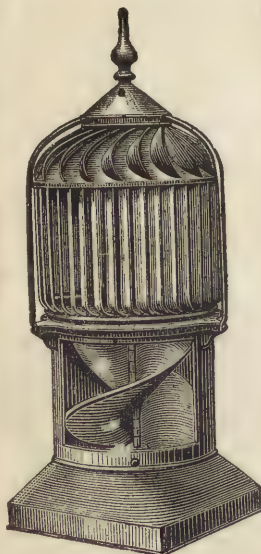
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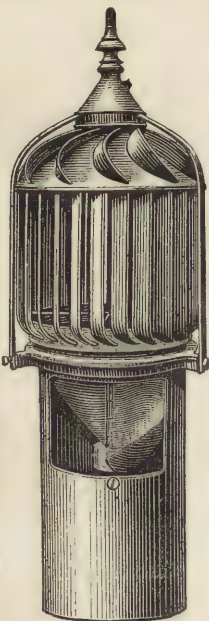
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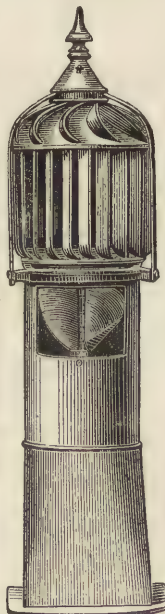
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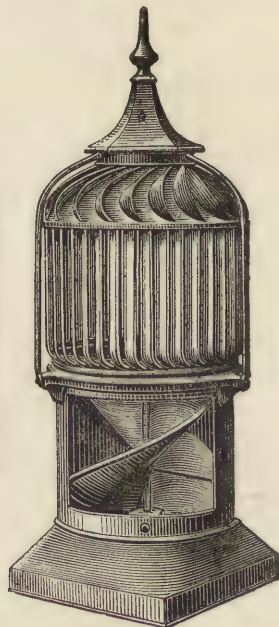
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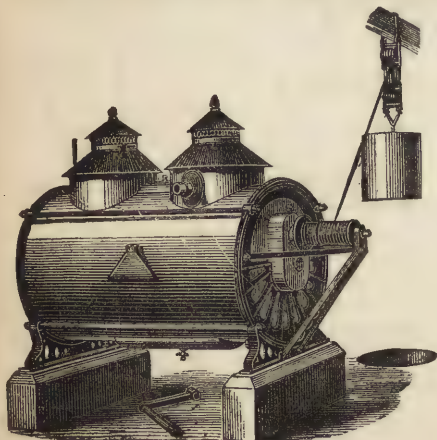
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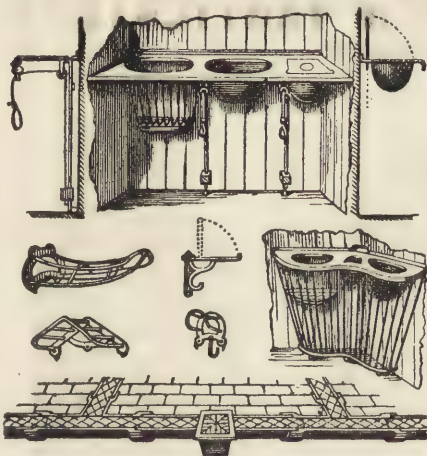
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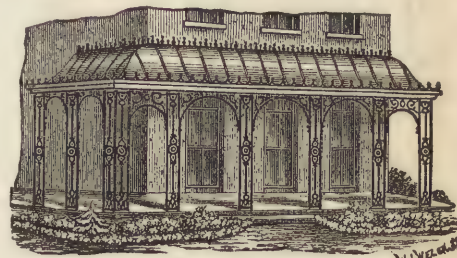
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II. Frederick Pepys Cockerell: a Memorial Sketch	Anonymous	Dec. 15th.
III. Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S., <i>Hon. Assoc.</i>	Jan. 12th, 1880
IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.
Adjourned Discussion on ditto	Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> , Professor Kerr, <i>Fellow</i> , and others.	Feb. 9th.
V. Portland Cement	Henry Faija, Assoc.M.Inst.C.E.	Feb. 23rd.
VI. The Polychromatic Decoration of various Buildings	John Pollard Seddon, <i>Fellow</i>	April 5th.
VII. Iron as a Material for Architectural Construction	James Allanson Picton, F.S.A.	April 19th.
VIII. "Mild Steel" and its applications to Building	Prof. Alex. B. W. Kennedy, M.Inst.C.E.	

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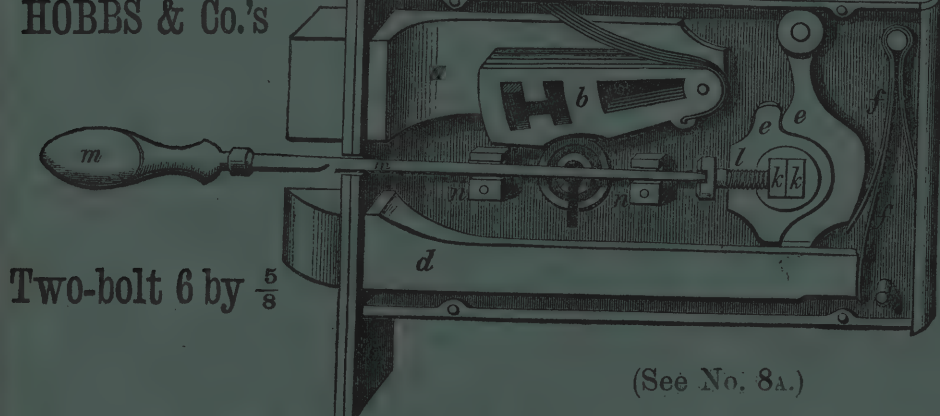
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VII. IRON AS A MATERIAL FOR ARCHITECTURAL CONSTRUCTION.

By JAMES ALLANSON PICTON, F.S.A.

THE art of architecture, in every stage of the world's history, has had such an intimate connection with the habits, thoughts and feelings of mankind, that its condition may be fairly considered as an exponent of the degree of cultivation and refinement attained by a people at any period of their progress. We must all live in dwellings of some sort; we need protection from the "skyey influences" of nature, whether they be those of arctic cold or tropical heat. After the earliest rude wants are supplied, convenience and comfort follow, and the sense of beauty latent in the human mind calls for expression; the religious instinct demands a local habitation for its vague aspirations after the unseen and eternal, and thus modified by external circumstances and inward tendencies, by laws, institutions, habits, modes of life, beliefs, superstitions, architecture becomes a reflection of the genius of the people by whom it has been brought into existence.

The materials employed in building must of necessity vary according to circumstances, and must produce a corresponding variation in the construction and design growing out of them. Earthwork, stone, brick and timber, lying generally within reach, have usually in differing proportions formed the staple of building materials* in all ages. Slate, tiles, plaster, metal and glass have been added as circumstances led to their use, for convenience and ornament.

The object of the present Paper is to trace out the use, progress and capabilities of iron as a building material, and to inquire in what direction these capabilities are leading us, and what influence they are likely to exercise on construction and design in the future. Important as iron has now become in connection with building, it was the latest of the metals so employed, and is comparatively speaking of very late introduction. There is no metal so widely diffused as iron. It exists in the atmosphere of the solar orb, and in that of many others of the heavenly bodies, and on our own planet it occurs in a vast variety of forms, and in many combinations. The reduction of wrought iron from rich ores is not a very recondite process, requiring considerably less knowledge and skill than is necessary for the production of bronze or brass, but the great heat and the dexterity of manipulation required were sufficient obstacles to defer its general use for a very long period. Countless ages existed since man appeared on the earth before metals were employed at all, and then rather in the shape of tools, implements and weapons, than for any constructive purpose.

Gold and silver were doubtless the first metals employed for ornamental purposes in buildings, from their intrinsic brilliance, their ductility, and their occurrence in a native state in superficial deposits. Copper would be the next metal brought into use, occurring as it does in native deposits, and having great facilities for working. How, when or where the composition of copper and tin, forming bronze, came into use, is a mystery on which investigation has hitherto thrown very little light. It is a remarkable fact that widely diffused as are the deposits of pre-historic bronze implements, extending over the whole of Europe and a great

* The adaptation of materials to necessity and convenience and the result as shown in the multiplicity of styles adopted are well brought out—though somewhat fancifully—in the late M. Viollet-le-Duc's "*Histoire de l'Habitation Humaine*."

part of Asia, and limited as were the supplies of tin to very few localities, the composition of bronze is found scarcely to differ in the slightest degree, containing uniformly 87.5 of copper to 12.5 of tin.

One of the first indications of metals in connection with architecture, occurs in the *Odyssey*, book vii., in the description of the Palace of Alcinous:—

“ ——— αὐτὰρ Ὀδυσσεὺς,
 Ἀλκινόου πρὸς δώματ' ἔε κλυτὰ πολλὰ δέ οἱ κῆρ
 ὦρμαιν' ἱσταμένῳ, πρὶν χάλκεον ὄνδον ἰκέσθαι.
 Ὡστε γὰρ ἡελίου αἴγλη πέλεν ἡε σελήνης
 Δῶμα καθ' ὑπερεφές μεγαλήτορος Ἀλκινόοιο
 Χάλκεοι μὲν γὰρ τοῖχοι ἐληλάδατ' ἔνθα καὶ ἔνθα
 Ἔς μυχόν ἐξ ὀνδοῦ περὶ δέ θριγκὸς κυάνοιο
 Χρῦσαι δὲ θύραι πυκινὸν δομον ἐντὸς ἔεργον
 Ἀργύρεοι δὲ σταθμοὶ ἐν χαλκῷ ἔστασαν ὀνδοῶ
 Ἀργύρεον δ' ἐφ' ὑπερθύριον χρυσῇ δὲ κορώνῃ
 Χρῦσαι δ' ἑκατέρθε καὶ ἀργύρεοι κύνες ἦσαν
 Ὅς Ἥφαιστος ἔτευξεν ἰδνίῃσι πρᾶπίδεσσι
 Δῶμα φυλασσέμεναι μεγαλήτορος Ἀλκινόοιο
 Ἀθανάτους ὄντας καὶ ἀγήρωσ ἥματα πάντα.

Χρῦσαι δ' ἄρα κούροι εὐδμητων ἐπὶ βωμῶν
 ἔστασαν αἰθομένας δαΐδας μετὰ χερσὶν ἔχοντες
 φαίνοντες νύκτας κατα δωματα δαίτυ μόνεσσι.”

The meaning is best brought out by a simple prose translation:—

“Then Odusseus hied to the noble palace of Alcinous, but many things stirred his heart whilst standing, before he reached the *bronze* threshold; for there was a radiance just like that of the sun or moon, on the high roofed hall of the mighty Alcinous. For indeed, *bronze* walls spread out everywhere from the threshold to the interior, and about the dark blue cornice. *Golden* doors closed internally the well fitted house; *silver* door posts rested on the *bronze* threshold, and over the *silver* lintel the *golden* Coróna. On each side were *gold* and *silver* dogs which Hephaistos wrought with intelligent skill, guarding the palace of the mighty Alcinous, deathless and free from decay throughout all time.

“*Golden* youths stood on beautiful pedestals, holding in their hands lighted torches, which by night shone upon the guests to the palace.”

Although we may suppose there is some amount of fancy in the poet's description, it is reasonable to infer that it is based on a substructure of fact, and that buildings existed in his day presenting the same general features. The temple of Solomon, described in the Books of Kings and Chronicles, presents some rather remarkable coincidences. The walls and floors are described as lined with wood overlaid with *gold*. The altars, lavens, &c., were of *bronze*. The two pillars in front of the temple, 18 cubits high, with their capitals and ornaments, were *bronze*, some of it polished and bright.*

Neither in the description of the palace of Alcinous, nor in that of Solomon's temple, is there any mention of iron as a structural material, but it appears to have been used for tools

* Gold plating has not altogether ceased in connection with buildings in modern times. The dome of the Invalides at Paris is gilt, but the dome of the church of St. Isaac at St. Petersburg is covered with gold plating of some thickness, and in the sun's rays shines like a star of the first magnitude at a distance whence no other part of the city is visible.

and for securing other materials, for it is recorded of the latter as remarkable "that there was neither hammer nor axe nor any tool of *iron* heard in the house whilst it was in building." It is also stated that King David in his collection of materials included "*iron* in abundance for the nails for the doors of the gates, and for the joinings" (probably hinges).

There are many allusions to iron in the Old Testament scriptures. Some passages are of a figurative character, where iron is the emblem of hardness, strength and power. Others are descriptive, and indicate the uses made of iron in those early times. It formed one of the articles of commerce at Tyre. The rough material was brought from Tarshish (Spain). Bright iron was procured from Javan (probably Ionia). It was used for tools and implements. Iron yokes, axes, hammers, instruments with iron teeth are spoken of. An iron pan is mentioned by Ezekiel. Thickets were said to be cut down with iron. Iron war chariots are attributed to the Canaanites. Goliath had an iron spear weighing 600 shekels, and other iron weapons are alluded to. Iron fetters were used to bind prisoners. An iron pillar is spoken of by Jeremiah in connection with brazen (or bronze) walls. These various allusions would seem to imply that iron was developed, and in general though limited use, at an earlier period than we are accustomed to attribute to it.

The manufacture of iron existed in India from very remote antiquity, though carried on in a very primitive manner. Vast accumulations of slag and cinder are found spread over large areas in various districts, and the manufacture is still carried on with but little change from the ancient processes. In the mosque of the Kútub, near Delhi, there is a wrought iron pillar 60 feet in length, dating from the fourth century of our era. It is only of late years that the production of a shaft of this dimension would have been possible in England.* A peculiar kind of steel called *wootz* has been made in India from a very early period, which was highly prized by the ancients, and the manufacture of which is still continued. It is made by a peculiar process, and is famed for its extreme hardness and elasticity. The extent to which iron was employed by the ancient Egyptians is a problem very difficult of solution. When we contemplate the enormous amount of labour expended upon the masonry and sculpture in the hardest granite, and the beautiful surface and high finish generally displayed, it seems difficult to imagine that any tools inferior to the hardest steel could have produced the result, yet the evidence is exceedingly scanty. Bronze occurs in the tombs in a variety of forms, but iron is almost entirely wanting. We read in several places in the Scriptures of the iron furnaces of Egypt, from which the children of Israel had been delivered. Iron mines have been discovered in Upper Egypt, and the remains of iron-works have recently been found near Mount Sinai. An iron plate has been found in one of the pyramids, and a sickle was found by Belzoni in one of the tombs of Thebes.

There is extant a fragment of Agatharchydes, a Greek author of the first century, quoted by Diodorus, in which, giving an account of the metallic productions of Egypt, he states that various bronze implements are found, but no iron. It has been thought by some that the Egyptians were acquainted with a method of hardening bronze tools which has been lost. This is very improbable, and we must leave the matter as a *crux antiquariorum* for future solution.

The Greeks obtained their iron from the Chalybes, a nation dwelling on the south coast of

* A cast of this shaft may be seen in the South Kensington Museum.

the Black Sea, Æschylus calls them, "σιδηροτέκτονες Χάλυβες," "the iron manufacturing Chalybes," whence the term χάλυψ, for steel. Steel was at that time produced directly from the ore. The process of hardening the steel by plunging it into water is alluded to by Homer in describing the action of Ulysses in putting out the one eye of the giant Polyphemus.

The use of iron by the Romans was of rather late introduction. The fine specular iron of the Isle of Elba had been smelted by the Etruscans from an early date, but it seems not to have been very extensively used in Italy. It was not until the time of the second Punic war that the Romans, extending their conquests beyond their original narrow seat, obtained supplies of iron and steel from Spain and Noricum, and discarded their bronze weapons for the harder and keener metal. Iron, however, was little used by the Romans in building construction. When Virgil describes the splendours of Dido's rising city, no mention is made of iron in any form; stone with the addition of bronze for plating are all the materials mentioned.

"His portus alii effodiunt; hic alta theatri
Fundamenta locant alii, immanisque Columnas
Rupibus excidunt, scaenis decora alta futuris."

"Hic templum Junoni ingens Sidonia Dido
Condebat, donis opulentum et numine divae
Aerea, cui gradibus surgebant limina nexaeque
Aere trabes, foribus cardo stridebat aenis."*

Vitruvius, in his celebrated treatise on architecture, makes very little mention of iron, or of metal at all. In lib. vii., ch. 2, *ferrum* is applied to an instrument for tempering lime—*ascia*. In ch. 3 it is again used for a trowel, and iron cramps or nails are described, "clavis ferreis." Cyprian and Corinthian bronze are mentioned, but its general use in building is nowhere referred to. Doors are alluded to, but the material not quoted. In the New Testament, Acts xii., 10, mention is made of an iron gate, and no doubt at that period iron had been brought into use in many useful forms, more, however, in the way of machinery, armour and weapons, than in building construction. For all constructive purposes bronze became gradually superseded by iron, which during the middle ages was worked with great skill and success. The wrought iron so employed did not undergo the process of fusion and puddling, but was obtained direct from the ore by roasting with charcoal, and working under the hammer. The metal thus obtained was of excellent quality, and was very skilfully manipulated. Armour and weapons attained a high degree of efficiency, and were finished with great taste. Although not employed in constructive building to any great extent, yet in the accessories, iron was in the middle ages treated with a freedom, and worked up with an elegance of design, which has never since been equalled.

To a certain extent the Romans had made use of wrought iron for ornamental purposes,

* "Here some design a mole; while others there
Lay deep foundations for a theatre.
From marble quarries mighty columns hew
For ornaments of scenes and future view.

Sidonian Dido here with solemn state
Did Juno's temple build and consecrate;

Enrich'd with gifts and with a golden shrine
But more, the goddess made the place divine,
On brazen steps the marble threshold rose,
And brazen plates the cedar beams enclose;
The rafters are with brazen coverings crowned,
The lofty doors on brazen hinges sound."

DRYDEN.

the few fragments which remain containing evidence of their skill, but in the dismal period which followed the breaking up of the Western Empire, the art became practically lost. It is to the rises of church architecture, and to the influence of the monasteries that we owe the development of this as of so many other arts.

The smiths of the middle ages laboured under many disadvantages. Rolling mills were unknown; the iron in its reduction from the ore had to be painfully wrought out by manual labour, the only mechanical aid being a tilt hammer worked by a water-wheel. Even the file had not been invented, the hammer, with the assistance of the punch and chisel, was the only instrument available. And yet with these imperfect means, what marvellous works did these old smiths achieve! In richness of fancy, in beauty of form, in adaptation to special purposes, in soundness of material and excellence of workmanship, nothing that modern times can show is fit to be compared with the smith's work of the middle ages. The free flowing scroll-work of the hinge bands, branching out into foliated and floral forms; the rich and elaborate intricacy of the locks, frequently cut out or forged from the hardest steel; the bolts, ring plates, knockers, handles, staples, brackets are each a work of art, characterized by individuality of conception and infinite variety of design.

Two descriptions of mediæval smith's work are especially worthy of notice; the well-covers and the grilles or iron screens. Unfortunately there are not many of the first remaining in anything like perfection, but sufficient fragments are in existence to indicate their extreme beauty. The rich and graceful curves, the combination of lightness and strength, show us what capabilities exist in iron when freely treated in accordance with its nature. Specimens still extant at Troyes, Beaune, Marcoussis, Antwerp, Ghent and other places, fully bear out this estimate.

Probably the grilles or screens, and the gates of the middle ages, exhibit the art of the smith in its greatest perfection. Of these, multitudes remain, of an infinite variety of design, no two being exactly alike. The wonder arises, that with such simple means, such wonderful effects could be produced. I may mention as worthy of notice the grilles in St. Gudule at Brussels, that round the tomb of Queen Eleanor at Westminster, St. Denis in France, and the tombs of the Scaligers at Verona. These glories have passed away, and circumstances have so changed as to prevent a possibility of their return. M. Viollet-le-Duc on this subject makes the following remark:—"Il en est de la fabrication du fer appliquée aux travaux d'art comme de beaucoup d'autres: ce que l'on gagne du côté de l'industrie, de la rapidité, de la puissance et de l'économie des moyens, on le perd du côté de l'art. En perfectionnant les procédés mécaniques, l'homme néglige peu à peu cet outil, supérieur à tout autre, qu'on appelle la main."*

In the application of iron to the purposes of construction, the mediævalists were by no means so happy. During the Romanesque period, iron does not seem to have been employed either in carpentry or masonry. At the end of the twelfth century, iron cramps were employed at the cathedral of Notre Dame at Paris, to connect the stones of the corbelled cornice. The oxydation, in the course of time, of these cramps had the effect of fracturing the stones; a similar result occurred at the Sainte Chapelle, from the introduction of iron

* "In the fabrication of iron applied to works of art it is the same as in many other cases: what is gained on the side of industry, rapidity, power, and economy of means, is lost on the side of art. In perfecting mechanical processes, we gradually neglect that tool which is superior to every other—the human hand."

chain bond into the walls. Experience in this practice does not seem to have taught wisdom, for even at the present day the mistaken use of iron in similar positions frequently leads to similar results.

The mediæval period of the use of iron may be said to have terminated about the middle of the sixteenth century. Down to that time cast iron was unknown. The discovery of the process by which fusible iron could be smelted from the ore, we owe to Germany. It probably arose from the gradual improvement of the blowing apparatus, by which the old blast bloomeries were transformed into blast furnaces. About 1550 the system was introduced into England, where there already existed great facilities, in the enormous quantity of scoriae accumulated about the ancient bloomeries, and in the abundance of timber for fuel. Cast iron ordnance was an article of export from England early in the seventeenth century. As the art of the moulder progressed, the art of the smith began rapidly to decline. The cheapness of cast iron, and the facility with which it could be manipulated, led to its extensive use in every department of life. The balustrade round St. Paul's is a good example of the early adoption of cast iron for such purposes. This was manufactured at the Sussex Iron Works, where the abundance of ore led to a profitable trade, until the remains of the ancient Forest of Anderida, which had furnished the fuel, became exhausted. It was not until the year 1735 that the problem of smelting iron with pit coal was successfully solved by Abraham Darby at Coalbrookdale.

The eighteenth century was the period of the commencement of what may be called the iron age. Manual labour was found too slow and feeble to suffice for the rapidly increasing demands of the world, and machinery was called in to supply the deficiency. But man's ingenuity required to be supplemented by *power*. The winds and waters were laid under contribution, but their use was limited, desultory and uncertain. It was the mighty force of steam, lying latent through untold generations, which at the call of science stood forth to do man's bidding, and to place the vast resources of nature at his feet. For these purposes there was and could be no instrument equal to iron. Iron then formed the basis of machinery ever progressing, machinery in its turn favoured and facilitated the production of iron; and thus the reciprocal action has constantly proceeded in an ever increasing ratio, and will continue to do so as long as mankind have wants to supply, and the physical world has domains yet to conquer.

It is remarkable within what a recent period the advantages of iron on any great scale have developed themselves. Down to the commencement of the present century the casting of iron pipes was so difficult and costly an operation that, in schemes for the supply of water to towns, wooden pipes, consisting of elm stocks bored up the centre and socketed together, were adopted for the mains.

One of the earliest uses of cast iron in public works was in the construction of bridges. Bridge-building forms the border line between architecture and engineering. Old Westminster and Blackfriars Bridges were designed by architects, but since the erection of London and Southwark Bridges, and particularly as applying to iron structures, the work seems to have been handed over exclusively to the engineer.

Soon after the discovery of cast iron in the sixteenth century, proposals were issued for its adoption in the erection of bridges in Italy. The matter slumbered for nearly two

centuries, and in 1755 the subject was revived in connection with a proposed bridge at Lyons, but the project was afterwards abandoned. In 1777 the first iron bridge was erected at Coalbrookdale in Shropshire, from a design by Mr. Pritchard, an architect of Shrewsbury. It is a cast iron arch of 100 feet span, constructed with continuous ribs, and although not exactly fulfilling the theory of its designer as to its being an arch of equilibrium, it displays great skill, and has stood with success the test of a century's traffic.

In 1796, another cast iron bridge was erected over the Severn at Buildwas by Thomas Telford, 130 feet span. The same year witnessed the completion of the celebrated iron bridge over the river Wear, connecting Sunderland with Monk Wearmouth. This structure is remarkable from the boldness of the design, the novelty of the principle adopted, and the mystery which has hung over its actual authorship. It has usually been attributed to Thomas Paine, and is so recorded by Mr. Robert Stephenson and Mr. Samuel Smiles in their respective works, but more recent investigations have proved that the bridge was designed and erected by Mr. Roland Burdon, M.P. for Durham, with the assistance of Mr. Thomas Wilson. Paine had previously, in 1786, patented an invention for the construction of bridges with cast iron voussoirs, and a model was erected near London carrying out his views. The principle adopted in the Sunderland bridge is identical with Paine's, but probably modified in its application. Burdon and Wilson took out a joint patent for the invention in 1802.

Another bridge erected on the same principle at Yarm, by Mr. Wilson in 1805, unfortunately fell down in the following year. The finest example of a bridge erected with cast iron voussoirs, and one of the latest so constructed, is Southwark Bridge, built by Rennie in 1814, with a central arch 240 feet span, and two lateral arches 210 feet span.

The next development in iron bridge-building was that of the suspension principle, of which undoubtedly the most beautiful specimen is the Menai Bridge, erected by Telford, and completed in 1825. The design prepared in 1814 was originally intended to span the River Mersey at Runcorn, on the site of the present railway bridge, but the funds not being forthcoming the matter was laid aside, and revived in 1819, when Telford was employed in improving the communication with Holyhead. This bridge is 460 feet between the piers with a versed sine of 40 feet. Nothing could be more graceful or fairy-like than the contour of this structure, the stability of which has been tested by more than half a century of use.

Suspension bridges are of course constructed with wrought iron, but down to the rise of the railway system, wrought iron had not been manufactured of dimensions and strength suited for large works where rigidity was required. The demands of the railways stimulated invention in this direction. Steam power facilitated the puddling and forging of much larger masses than heretofore. Rollers, of a power and adaptability previously unknown, turned out plates, bars, beams and rails, of patterns and forms unlimited in their dimensions. This improvement did not come all at once. Most of the early railway bridges were of cast iron, sometimes attended with disastrous results, as in the case of the unfortunate Dee Bridge at Chester. At this period cast iron was much used in private buildings for bressummers and beams, wrought iron not being obtainable in suitable sections and lengths. The hazardous nature of cast iron when subject to cross strains, and the difficulty in many cases of obtaining abutments for bridges with cast ribs, led to the adoption in many of the early railways of cast iron bow and string bridges, the rails being carried at the level of the ties. These

expedients were ultimately rendered unnecessary by the progress of the iron manufacture, which wonderfully increased the facilities of the engineer.

The erection of the tubular bridge over the Menai was preceded by many interesting experiments by Messrs. Fairbairn and Hodgkinson, which threw a flood of light on the nature and strength of the metal. The result in the bridge, as executed, is no doubt satisfactory as to strength and stability, but neither economically nor æsthetically can it be pronounced a success. The quantity of material far exceeds the necessities of the case, and compared with its sister structure it must be pronounced unsightly in the extreme.

The latest development in iron bridge building, and that which bids fair to supersede the others, especially for railway purposes, is the lattice, the principle of which scientifically applied combines the greatest amount of strength with the utmost economy of material.

A very satisfactory example of this principle is to be found in the London and North Western Railway Bridge over the Mersey at Runcorn, designed by the late Mr. Baker, but in length, span and dimensions, it is far exceeded by the viaduct over the St. Lawrence, and others since constructed. The most notable, owing to recent unfortunate circumstances, is the Tay Railway Bridge, two miles in length, in 85 spans, from 245 feet downwards. Several principles of construction are introduced, the larger spans having lattice girders, the smaller ones some bowstring, and some plate girders. This is not the place, nor has sufficient time elapsed for analysis or criticism. A single remark however may be ventured. Experiments in tensile strength and bearing power may be perfectly satisfactory, and science and skill of the highest character may be employed, apparently leaving nothing to be desired, but there is one factor outside all these which it is possible to forget, that is the element of simple dead weight, which offers a resistance to the elements, without which science may struggle in vain. The Britannia tubular bridge may be criticised for its wasteful expenditure and its unsightly appearance, but nothing short of a convulsion of nature could remove it from its base. The proposed railway bridge over the Forth at Queensferry, if ever executed, bids fair to surpass all its predecessors. Girders, with a span of 1600 feet, and towers, for the purpose of suspension chains, nearly 600 feet in height, almost take away one's breath in the conception, but there is no limit to human daring when backed by science and skill. The facilities afforded by wrought iron and steel are destined to carry the art of bridge-building to an extent utterly inconceivable in previous times.

To the extension of the railway system, combined with the use of wrought iron, we owe the progress of roof construction. So long as timber was the only material available the span to be covered was necessarily very limited, 90 to 100 feet being the extreme. The celebrated Riding School at Moscow had a span of 235 feet, but its construction was not successful, and it had no imitators. The modern railway stations at St. Pancras, Birmingham, Liverpool, and elsewhere, exhibit roofs with a width of span, and scientific simplicity of construction, which would have been impossible in any material except wrought iron. For domical roofs, wrought iron affords special facilities. The Halle aux Blés at Paris is one of the earliest examples. The largest and finest probably is that constructed by Mr. Sydney Smirke over the Reading-room at the British Museum, 140 feet in diameter.

In the construction of floors, the improvements in the manipulation of wrought iron have provided special advantages. The ponderous and treacherous cast iron beams have been

replaced by wrought rolled girders for moderate spans and rivetted **I** or box girders for those of greater extent, whilst smaller scantlings of all forms can be had for every requirement. Our French neighbours have availed themselves of these advantages to a much greater extent than prevails in England. A large proportion of the modern buildings, both in Paris and in the provinces, have both roofs and floors fireproof. The main beams and joists are rolled iron, with wrought iron bars fixed at right angles to them, clipping the upper flange of the joist, and so bent as to allow the bottom of the bar to be level with the lower flange. Plaster concrete is run between and over all, forming a solid durable floor. A wrought iron floor has recently been constructed for the new Reading-room at the Liverpool Free Public Library, a circular building 100 feet in diameter, without any support from columns or piers.

The progress of wrought iron has not been confined to building construction. In marine architecture it has effected a complete revolution, and in so doing has placed our own country far in advance of every other nation. The first sea-going iron ship was the *Richard Cobden*, 522 tons burden, built in Liverpool, in 1844, by Messrs. Jas. Hodgson and Co. Some years elapsed before the example was followed to any great extent. It was the advantage presented by the progress of steam power which led to the almost universal adoption of iron for ships. The *Great Eastern*, built on the Thames in 1858, of the burden of 12,000 tons, was before her time, and the result was very unfortunate; but the gradual and natural progress of steam navigation has almost bridged the interval, the latest ship now in progress of building having a tonnage of 8,500. It is remarkable, as showing the direction in which improvement is tending, that whilst the earlier ship of 12,000 tons had only 2,600 horse power, the later one with a burden of 8,500 has horse power of upwards of 8,000. Great as has been the change in our mercantile marine by the adoption of iron, the revolution in the ships of the Royal Navy has been of a much more startling character. The old wooden *Victory* or the *Temeraire*, towering above the water with her three-decker broadside of 120 guns, her lofty and complicated rig, and her immense spread of canvas, had, beyond the fact that they were both fighting ships, absolutely nothing in common with a modern ironclad, such as the *Devastation*, low in the water, with thick armour-plating, central turret rising like a donjon tower, no rigging, no canvas; in place of the broadside from sixty fiery throats, two or three immense pieces worked by machinery, and moving through the water like an automaton by internal force—the same valour, the same skill, but different in its application.

It would be fruitless to follow the various modern applications of iron which now extend into every department of industry. Machinery every year more and more supersedes manual labour, and machinery is identified with the use of iron. Whether for good or for evil this is inevitable; it is the law of development which no individual effort can prevent or retard.

We have thus cast a hasty glance at the progress of iron construction to the present time. The inquiry remains, what is to be its influence in the future? That it will contribute to aid man's power over the material elements of nature is certain. The moral results lie beyond the province of this Paper, but it may be permitted to cast a forward glance at the probable influence of iron in one department, that of architectural construction and design. To what extent can iron be advantageously employed by the architect, and how far will it affect the æsthetic character of his work? All true design arises out of construction; every style, which has attained any eminence, owes its effect to the adoption of its essential

parts as sources of beauty, rather than to any attempt to conceal them. The use of iron, whether in construction or design, is a new source of power and effect put into the hands of the architect for good or for evil. The adoption of a new material should lead to new canons for its suitable employment, or rather to new applications of the eternal principles of truth and beauty.

Mr. Ruskin, who may justly be called the Corypheus of architectural critics, has some pertinent remarks on the use of iron in architecture. He speaks as follows:—

“Perhaps the most fruitful source of these kinds of corruptions which we have to guard against in recent times, is one which, nevertheless, comes in a ‘questionable shape,’ and of which it is not easy to determine the proper laws and limits; I mean the use of iron. The definition of the art of architecture, given in the first chapter,* is independent of its materials; nevertheless, that art having been, up to the beginning of the present century, practised for the most part in clay, stone or wood, it has resulted that the sense of proportion and the laws of structure have been based, the one altogether, the other in great part, on the necessities consequent on the employment of those materials; and that the entire or principal employment of metallic framework would, therefore, be generally felt as a departure from the first principles of the art. Abstractedly there appears no reason why iron should not be used as well as wood; and the time is probably near when a new system of architectural laws will be developed, adapted entirely to metallic construction.”†

This was written in 1849, before the era of Great Exhibitions, Crystal Palaces, enormous Railway-station roofs, and previous to the great improvements in the manufacture which have so much facilitated the employment of iron. At the present day it is scarcely probable that he would have written as follows:—

“Architecture being in its perfection the earliest, as in its elements it is necessarily the first, of arts, will always precede in any barbarous nation, the possession of the science necessary either for the obtaining or the management of iron. Its first existence and its earliest laws must, therefore, depend upon the use of materials on the surface of the earth, clay, wood or stone; and as I think it cannot but be generally felt that one of the chief dignities of architecture is its historical use; and since the latter is partly dependent on consistency of style, it will be felt right to retain as far as may be, even in periods of more advanced science, the materials and principles of earlier ages.”

Again:—

“The fact is that every idea, respecting size, proportion, decoration or construction, on which we are at present in the habit of acting or judging, depends on pre-supposition of such materials, and so it may perhaps be permitted to me to assume that true architecture does not admit iron as a constructive material, and that such works as the cast iron central spire of Rouen Cathedral, or the iron roofs and pillars of our railway stations, and of some of our churches, are not architecture at all.”

There is more to the same effect, the rule laid down being “that metals may be used as a *cement*, but not as a support.” He continues:—

“But the moment that the iron in the least degree takes the place of stone, and acts by its resistance to crushing, and bears superincumbent weight, or if it acts by its own weight as a counterpoise, and so supersedes the use of pinnacles or buttresses in resisting a lateral thrust, or if, in the form of a rod or girder, it is used to do what wooden beams would have done as well, that instant the building ceases, so far as such applications of metal extend, to be true architecture.”

* “Architecture is the art which so disposes and adorns the edifices raised by man, for whatsoever uses, that the sight of them may contribute to his mental health, power and pleasure.”—“Seven Lamps,” Ch. I.

† “Seven Lamps,” pp. 36-8.

I have made these copious extracts from a writer whose power and influence we all admit, since nowhere else do we find the objections against iron as an æsthetical element, so clearly and lucidly stated. I would, however, with all modesty suggest that much may be advanced on the other side. The principal use of metals, including iron, we are here told is a *cement* for connecting stones together. Every practical builder knows that for this purpose iron is about the worst material that could be employed, its operation being to disintegrate and separate by its oxydation and expansion, and to destroy rather than support.

The unfortunate cast iron spire of Rouen Cathedral I give up as deserving the severest reprobation of the critic, not because of its being iron, but for its tastelessness and incongruity; but what about "the iron roofs and pillars of our railway stations," which we are told "are not architecture at all"? Writing thirty years ago, there was very little in such structures to attract admiration or attention, but look at them now. Westminster Hall, apart from its historical associations, exhibits in its wonderful roof a signal example of skill and beauty combined. This says Mr. Ruskin is true architecture. Turn then to the railway station at St. Pancras, with a noble roof four times the span of Westminster Hall, and in the construction of which simplicity and skill have produced a result perfectly satisfactory to the eye on the score of strength and stability, whilst the grand sweep of its gigantic curves fills the mind with a sense of harmony and fitness which it is difficult to separate from a feeling of the beautiful. Why are we to deny to structures of this class the claim of being "true architecture"?

Surely the ultimate or radical principle of all true architecture is to use the materials within our reach in such a manner as will bring out their capabilities most efficiently for strength and commodity, and superinduce upon their employment such decorative forms as the nature of the material may suggest. It is on this foundation that every style which has obtained a footing in the world has been based. What can appear more opposed to each other at first sight than the pure Greek of the age of Pericles, and the pure Gothic, say of the thirteenth century? Yet diverse as they seem they are equally developments of the principle of truth and adaptation. The materials of both are stone, but the Greek stone, being marble, led to a delicacy and refinement of detail of which the northern style was incapable. Given then the material to work with, and keeping in view that the main idea of the one was trabeation or horizontality, and that of the other pointed arcuation, the mind can follow the consistency and adaptation of all the parts, even to the minutest detail. Now can anyone doubt for a moment that, if iron had been equally available at the two periods in question, the genius which designed the Parthenon or that which soared aloft in the nave of Amiens or the choir of Le Mans would have been equally successful in the design of a metallic structure, especially looking at the beautiful bronze works of the Greeks and at the rich fancy which characterizes the metal works of the mediæval artists. To prohibit such an attempt, or to limit the exercise of invention, would be "to put a yoke upon the necks" of our rising architects, "which neither our fathers nor we were able to bear." The mischief arises from the attempt "to put new wine into old bottles," to cramp and confine the use of the new material within the lines of the old, with which it is altogether incongruous.

A curious illustration of this tendency may here be mentioned. During the revival of Gothic architecture, about the early portion of this century, the late Thomas Rickman, who did excellent service in explaining and popularizing the study, was employed to design a

considerable number of churches in the revived style. Whether owing to the want of skilled masons or from motives of economy, a large portion of the details of these churches were executed in cast iron; tracery, mullions, labels, finials, crockets, even piers and arches. The effect, it need scarcely be said, was poor, thin and incongruous, and the attempt was an utter failure. If iron is ever to take its place as an independent factor in architectural design, it must be by adopting a new point of departure, ignoring its conventional uses as a mere auxiliary to other materials, and treating it boldly on its own merits and capabilities. The Scylla and Charybdis of architectural art have hitherto been concealment and imitation; concealment of the real construction, and imitating in one material the characteristic properties of another.

Let us turn to Mr. Ruskin again. He sets out with the plain principle:—

“Know what you have to do and do it, . . . expressing the great principle of success in every direction of human effort; for failure is less frequently attributable to either insufficiency of means or impatience of labour, than to confused understanding of the thing actually to be done.”*

“Whatever is in architecture fair or beautiful, is imitated from natural forms; and what is not so derived, but depends for its dignity upon arrangement and government received from human mind, becomes the expression of the power of that mind, and receives a sublimity high in proportion to the power expressed. All building, therefore, shows man either as gathering or governing; and the secrets of his success are his knowing what to gather, and how to rule.”†

These observations are just and true. Let us now endeavour in a general way to apply them to the subject before us. What are the peculiar properties of iron, more especially wrought iron, as a material for building? I should sum them up briefly, as strength combined with lightness and plasticity. These qualities are admirably fitted for construction and decoration in some cases, and not so well adapted in others, and skill and taste are required for their just discrimination and application.

When the scheme for the first great Exhibition in 1851 was launched, designs and proposals of all sorts were broached as to the design and construction of a suitable building. They all fell flat and were pronounced by the public voice to be cumbrous and unsuitable, being based on the conventional forms of brick or stone building. In a moment of inspiration Sir Joseph Paxton pointed out how the difficulty could be surmounted by a structure of iron and glass. It is easy to ridicule this as a mere gardener's idea of an enlarged greenhouse. When Columbus made the egg stand on its end by giving the shell a slight bruise the bystanders exclaimed that “anybody could do that,” but the same fertile imagination and readiness of expedient led to the discovery of the new world; and Paxton's happy thought has been further expanded and developed so as to furnish a principle of construction now universally adopted in all buildings for a similar purpose. Where a large area has to be covered for bringing together a numerous assembly for a temporary purpose, such for instance as the Kibble Palace at Glasgow, there is no material and no mode of construction so economical and effective as the combination of iron and glass. It is in fact a tent constructed with durable materials. Modern improvements in the manufacture of iron have rendered easy what would formerly have been impossible.

But it may be said this is a development in one direction only. What about houses,

* *Seven Lamps*, p. 1.

† *Ibid*, p. 64.

public buildings, churches, street architecture? In all these departments there is progress already attained and a reasonable prospect of further rapid advance. I have already alluded to the increased employment of wrought iron in the roofs and floors of private buildings, especially in France. Beyond the merely constructive portion, its use is extending in dome lights, galleries, entrance doorways, windows and balconies. In public buildings and churches there has been a timidity in the use of iron for roofs in a manner to combine strength with beauty. The iron roof when adopted is usually concealed. If an ornamental or decorated open roof is designed it is usually of timber, except vaulting is introduced. There seems no good reason for this neglect. The adoption of iron might in the first instance require more invention and thought, but the great advantage of security from fire should be a sufficient inducement for the change. In all roofs of great span, the facilities of iron have utterly discarded timber. Street architecture, especially of a commercial character, seems to afford a wide field for the application of iron in a decorative form, but the hand of skill combined with taste will be requisite to prevent its becoming an abortion. Nothing could be more odious or repulsive than long lines of glazed fronts with no relief but flimsy metal bars, looking like houses of cards ready to fall with a breath of wind or the slightest concussion. I have known structures of this kind, perfectly safe in reality, but the outward aspect so flimsy and insecure, that tenants were afraid to trust themselves within the precincts. The true principles are not far to seek; the main lines should not only be strong, but made to appear so, massive if you will, exhibiting weight as well as strength. Within these outlines there may be wide open spaces where the true artist can exercise his taste and give play to his fancy in a material plastic enough to take any form, strong enough for protection and resistance, and light enough to irradiate the interior even in the murky atmosphere of a city. We are not without hints even from the olden time; in many of the frescoes on the walls of the Pompeian houses, or of the ruined halls on the Palatine, there is a style of architecture displayed which may be the mere fancy of the artist, but which, whilst preserving the leading forms of classical design, exhibits a lightness and grace which would easily serve for models for execution in metal. Many of the shafts of bronze candelabra display the same grace and elegance of form. Amongst the arabesques of Raphael in the Vatican there is a display much of the same character. There is ability enough amongst our modern race of architects, if this course were pursued, to strike out a new path for the progress and adaptation of metallic, and especially wrought iron, construction, which would undoubtedly lead to advantages and results not hitherto anticipated. It would be invidious to mention specific cases, but instances might be pointed out in which, proceeding somewhat on the lines here laid down, the result has been fairly satisfactory.

The imperfect remarks in this Paper are not put forward in any spirit of dogmatism, but from a conviction that a general review of the progress of iron as a constructive building material is calculated to throw light on its probable future. Science has placed within our reach a new constructive element so to speak, of which the engineer has hitherto almost enjoyed the monopoly. Let the architect put in his claim. The material is plastic and ready to take any form that genius and taste may suggest, and in this way the motto which should characterize all true architecture, "Strength, commodity and beauty," may be fully realized.

VIII. "MILD STEEL" AND ITS APPLICATIONS TO BUILDING PURPOSES.

By ALEX. B. W. KENNEDY, M.Inst.C.E., Prof. of Engineering, University Coll., Lond.

UNTIL some twenty years ago it would have been safe to define steel as iron which possessed the properties of hardening and tempering, those properties depending essentially on the presence with the iron, in a state not even now fully understood, of a small percentage of foreign material, primarily carbon. Within that time, however, the popular meaning of the word *steel* has very greatly changed, and it now includes, as generally accepted, many varieties of material which can be no more tempered or hardened than many qualities of wrought iron. It is worth while looking shortly at the way in which this change has come about. The use of iron, on any large scale, in the construction of bridges, buildings or ships is comparatively very recent. Even cast iron only made its first appearance in large structures in this country when Abraham Darby built the Coalbrookdale arch of 100 feet span over the Severn in 1779. Wrought iron came into use for such purposes only about half a century ago, when Fairbairn began building iron ships,—the first large wrought iron bridges being some years later. Once the suitability of wrought iron for such constructive purposes was fairly demonstrated, we all know the enormous, the almost unexampled rapidity with which its use became general. As soon, however, as the novelty of construction in the new material had worn off, and the first glow of enthusiasm about its strength and capabilities had cooled down, engineers began characteristically enough to find out its defects, and to see that, good as it was, there was plenty of room for something better. Many times the wish came that *steel* could be used, but its enormous comparative expense almost prevented the wish finding expression. Steel was then, it is to be remembered, crucible steel of extremely great tenacity as well as hardness, and the advantages which its enormous tenacity would give to it in construction were of course fully understood. The effect of looking at the matter from this point of view was not unnaturally that general attention became more concentrated on the *strength* of steel than on its other characteristics. We had already got a material as good as we could expect for tools and instruments, but now there was wanted something resembling it for totally different and infinitely more extended uses. For these uses too, the capability of hardening was a positive drawback instead of an advantage. The material had often to be heated and re-heated, cooled and re-cooled, over and over again in the process of using it, and if each time that this happened it became hard, it would have each time to be annealed or softened again before anything more could be done with it. It seems as if we had come unconsciously, in this way, to be looking for some material which should have the tenacity of steel *without*, as far as possible, its other and more characteristic properties. There was no name for this not-impossible, hoped-for material, and it was called always *steel*, without recognizing fully, perhaps, that whatever it might be it could hardly be steel, if we had succeeded in eliminating from it the particular properties which for centuries had been considered the essential characteristics of that metal.

Thus it came about that when, after many attempts in recent years, Bessemer and Siemens and others have succeeded in producing such a material,—a material from which in many cases nearly all the characteristically steely properties have disappeared,—which is really sometimes a

very pure iron with a specially high tenacity, it is still called *steel*. To distinguish it from the tempering steels it is now generally known as *mild steel*, and as such I shall have frequent occasion to refer to it. Several attempts have recently been made to introduce a better nomenclature for modern steels, and I only echo the opinion of many of our best known ironmasters and metallurgists when I deprecate the fact that the use of the word *steel* has been continued when the character of the metal itself has been so greatly changed. But this is not the place to discuss such a point, and I must therefore leave it with these few words of explanation.

The crucible cast steel which was introduced by Huntsman about 140 years ago contained a considerable percentage of carbon, and was therefore comparatively fusible; the chief difficulty in the way of making the milder or purer steel, of which I am now speaking, has lain in the fact that as its proportion of carbon diminished, the temperature necessary to melt it increased. Until twenty years ago practically no means existed for obtaining such a temperature (except in a laboratory), and consequently none of our malleable iron, or iron nearly free from carbon, had ever been melted. It was rolled, at a welding heat, from piles or faggots of separate bars, just as it is now. To give it the wished-for additional strength it was essential that it should receive that homogeneity which could only be obtained by melting it, and then rolling it from solid homogeneous ingots instead of from welded piles. Two essentially different processes now exist by which the enormously high temperature necessary for making melted ingots of nearly pure wrought iron can be obtained, as well as many modifications of them. Both these processes are in daily use, and before describing the "mild steel" which is made by them, it may perhaps be interesting if I describe briefly the processes themselves and the plant used in conducting them, the latter being illustrated by the diagrams upon the wall.

The Bessemer process, which in a little more than twenty years has revolutionized one of our most important industries, was first published to the world at the meeting of the British Association at Cheltenham in 1856, when Sir Henry (then Mr.) Bessemer read a Paper with the somewhat startling title, "On the Manufacture of Iron and Steel without the use of Fuel." This title, it must be confessed, is somewhat misleading; fuel there is in plenty, although a certain characteristic part of the process takes place without the separate addition of any substance specially intended to act as fuel. The Bessemer process, as will be remembered, rests on the discovery of its inventor that, by forcing air at a high pressure through a bath of liquid cast iron, the combustion of the carbon and silicon in the iron (by means of the oxygen thus brought into intimate contact with it), would generate a heat so intense as not only to keep the cast iron melted while it remains cast iron, but to keep it still fluid after all the carbon and silicon are burnt out of it, at a temperature in comparison with which melted cast iron might almost be said to be luke-warm.

Among the latest and most perfect arrangements of plant for carrying out the Bessemer process is that used at the Eston Steel Works of Messrs. Bolckow and Vaughan, at Middlesboro', the method of working which may be briefly described. The ore,—comparatively rich and pure ores only being used,—is reduced in a blast furnace of the type and dimensions usual in the Cleveland District, but arranged so that the melted iron, instead of being run into pigs, can be run into 8-ton ladles carried on trucks upon

a line of rails in front of the blast furnaces and under the higher ends of the pig beds. Each ladle, after being filled, is carried away by a locomotive to the converters. The converter itself, in which the characteristic part of the Bessemer process is carried on, is a vessel chiefly of wrought iron, and large enough to take a charge of from five to ten tons. It is lined with extremely refractory silicious material known as Ganister, and its lower end, which can be readily detached, contains a number of fire-clay nozzles or twyers, each one pierced with six or eight small holes about half an inch in diameter. The whole converter is mounted on trunnions, and hydraulic gear is arranged by which it can be almost instantaneously turned into any position. The ladle of molten cast iron from the blast furnace is pushed on to the table of an hydraulic lift, carried by this up to the converter platform, and its contents then poured into the converter which is turned down to receive them. The blast is then turned on, and the converter turned up, the pressure of the air (twenty to twenty-five pounds per square inch) preventing any metal running down through the holes in the twyers. The process goes on without interference for fifteen or sixteen minutes; by which time the greater part of the carbon and other foreign ingredients are burnt out of the iron, and there remains in the converter a bath of nearly pure iron. It is necessary, however, to have in the iron a certain definite although very small percentage of carbon; and this end is generally obtained by the addition, at this stage of the process (that is, after the complete decarburisation of the melted iron), of a weighed quantity of melted spiegeleisen or (in some cases) of ferro-manganese, the one a natural, the other an artificial compound of cast iron and manganese. Directly or very soon after the spiegel is run into the converter the latter is once more turned down, its contents are emptied into a ladle carried by an hydraulic crane below it, and from this ladle the ingot moulds are filled. Almost before the last ingots have been teemed the workmen have begun lifting the moulds from the first; the white hot blocks are removed to a heating furnace, allowed to lie there until the whole metal may be supposed to be equally well set, and then taken out and rolled off, often without any further heating, into rails, bars, angles or whatever they may be intended for. In the case of plates the ingots are usually hammered into slabs, and cut to weight under a steam hammer before being sent to the rolls at all.

Such, in the briefest outline, is the process by which "Bessemer steel" is made. The details, of course, vary in different cases; the most important difference is that it is only in some of the newer and larger works that the metal is taken direct from the blast furnace to the converter in a melted state. In general the converters have, beside them, cupola furnaces, in which the pig is remelted for use. The spiegeleisen or ferro-manganese is melted in separate furnaces of the same type, placed beside the other cupolas at such a height that the metal can be run direct down to the converters. A pair of 5-ton converters may run 700 to 1000 tons, and even more, of metal per week, the week consisting of ten "turns," the men working on day and night in shifts as in all ironworks. There is a loss of metal in the process which amounts to 14 or 15 per cent. in ordinary practice, and about 9 or 10 per cent. when the metal is run direct from the blast furnace in the way I have described. The bottom of the converter lasts seven or eight blows, and then has to be taken out and replaced by another.

The method by which the requisite high temperature is obtained in the open hearth process is entirely different from that used by Sir Henry Bessemer: it is by the use of the

well-known "regenerative" principle of Dr. Siemens, without which, in some application or another, scarcely any metallurgical operation now goes on. The Siemens furnace is a large shallow hearth, having on one side doors by which the materials can be introduced, and on the opposite side a tap-hole for the removal of the melted metal. At each end of the furnace, near its roof, are openings communicating with four chambers, placed below it and filled with fire-bricks in open stacks. The fuel is burnt in a separate furnace called a gas producer, where only an imperfect combustion is obtained, and the resulting carbonic oxide passes along to the furnace through one of the regenerative chambers. Air at the same time is allowed to pass in through the adjoining chamber; the two gases mix just where they enter the furnace, and a very intense combustion ensues. The gaseous products of combustion, having done their work but being still at an extremely high temperature, pass away through the other two chambers, parting with the greater portion of their heat to the fire-bricks stacked in them, and leaving eventually comparatively cool. After this has gone on for some time the directions of the air and gas currents are reversed, the cold air and cool gases are brought in through the chambers just heated up, while the other chambers, now much less hot, become the recipients of the heat of discharge. And so the process goes on, each pair of chambers receiving and giving up heat alternately. By this beautiful arrangement much fuel is saved, owing to the utilization of waste heat; while not only does a very much higher temperature become available, but it is a temperature which is to a wonderful degree under control, a thing scarcely obtainable in any other way.

Mild steel is made in the open hearth chiefly by two processes, the one known as the Siemens or *ore* process, and the other as the Siemens-Martin process. In the former a bath of pig iron is first melted in the hearth, and then the carbon is removed from it by the addition at intervals of pure oxide ore. In the latter the carburised pig is as it were diluted by the addition, from time to time, of wrought iron or steel scrap, as it lies melted in the furnace. In both processes *spiegel* or ferro-manganese is added at the end, and then the contents of the furnace are run into ingot moulds and treated in the way I have described. The furnaces hold from five to ten or twelve tons of metal, and the process takes from eight to ten hours instead of fifteen or twenty minutes. This slowness has, however, certain considerable advantages, for it allows everything to be done deliberately: samples can be taken out of the furnace, analyzed and tested, before the charge is run. The longer time during which the metal lies melted may also conduce to greater soundness of ingots, although there seems deficient evidence on this point.

It would be out of place for me here to attempt to make any comparison between the metals produced by the Bessemer and the open hearth processes even if I wished to do so. But I may just say that, although I have discussed the matter with very many engineers and shipbuilders who have used both, I have not found one who could give from his own experience any very decided preference to either.

I must not leave this part of my subject without alluding briefly to two great difficulties, which still stand in the way of the manufacture of mild steel. The first is that as neither of the two processes which I have described get rid of either phosphorus or sulphur to any sensible extent if they are once in the pig iron, and as both these materials have a most deleterious influence on the steel, only very fine and pure qualities of ore (mostly imported) or of pig can be

used in them. Such impure pig, for instance, as is produced from our own Cleveland ore has hitherto been quite useless for steel making. It is satisfactory to know that this difficulty seems in a fair way of disappearing. The process introduced within the last two years by Messrs. Thomas and Gilchrist and Mr. Snelus seems already to have advanced beyond the stage of experiment. One of our largest Sheffield firms is now making Bessemer steel from common pig continuously, and at the Eston works the new converters, which have been made for the purpose, will very soon be at work. The principle of the process is the addition of some basic material (lime), so as to make the slag *basic* instead of, as heretofore, *acid*, in which condition it will take up the phosphorus as phosphoric acid, and keep it out of the steel. The chief difficulty has been that of finding for the furnace a new lining which should have the necessary refractoriness, and yet should be basic instead of silicious, but this difficulty, it is believed, has practically been overcome.

The second point is, that it is very difficult to obtain ingots free from blow-holes or honey-combing, which without great care affect the rolled products injuriously. This difficulty is certainly surmounted by the method of Sir Joseph Whitworth, in subjecting the ingot while still liquid to an enormous pressure by means of hydraulic apparatus, and the same method is also used in some Continental works to a considerable extent. But the great cost of "compressed steel" places it out of our reach as yet for ordinary purposes; we have to be content with taking all precautions in the arrangement and form of the moulds, and the method of casting, to ensure that the ingots shall be as sound and free from honey-combing as possible.

By the use of the regenerative system it is possible now to make mild steel in crucibles, by the old method, and such steel is frequently made of magnificent quality. Its cost, however, puts it out of the question for use in building construction, so that it may be left here without further notice.

Having now concluded this brief outline of the present position of the steel manufacture, so far as it concerns such steel as is at all commonly used for constructive purposes, I must next say something as to the characteristics of the material itself. I may class these conveniently enough under four heads, viz.:—(1) uniformity and trustworthiness; (2) workability; (3) strength; and (4) rigidity. That so-called steel of many different qualities could be made much stronger than iron has never been denied, but for many years there stood in the way of its extended use the belief—unfortunately at one time too well founded—that it could not be *trusted*. Great difficulties were indeed experienced for a long time in ensuring uniformity of quality, and the name of the best firm in Sheffield would have been no guarantee that in any large delivery there would not be great variations, and too probably a good many failures. And further, if the material *were* uniform, it was believed to require—perhaps it did at one time require—very specially careful handling while being worked, specially trained workmen to handle it, and altogether a gingerly kind of treatment which could not practically be obtained in ordinary circumstances. Fortunately there were not a few manufacturers who saw that much of this was at least great exaggeration, if not pure fancy, and who were firmly enough convinced of the value of the new material to go on using it through evil report and good. They staked much upon their belief, however, and were compelled for their own sakes to insist most strenuously upon the steel makers leaving nothing undone which should ensure the uniform character of their material. The steel makers were nothing behindhand in the

matter, and have probably done more in ten years to perfect their material than had ever before been done, in such a case, in half a century. Mr. Barnaby, in a paper which he read before the Institution of Naval Architects in 1875, put the question definitely thus:—"What are our prospects of obtaining a material which we can use without such delicate manipulation and so much fear and trembling? We want a perfectly coherent and definitely carburised bloom or ingot, of which the rolls have only to alter the form in order to make plates with qualities as regular and precise as those of copper and gun metal, and we look to the manufacturers for it." I believe it may now be said with certainty that the manufacturers have not been looked to in vain, and of this it is easy for me to give you evidence. In the first place it happens that within the last few weeks I have been testing, in my laboratory at University College, ordinary commercial samples of all the three materials mentioned by Mr. Barnaby, and the following are the results—three similar pieces of each material being tested at a time. The difference between the highest and lowest tenacities of three bars of ordinary (cast) copper amounted to 29·5 per cent. of the strength of the highest, the same difference with ordinary gun metal being 21·6 per cent., and with hard gun metal 12·4 per cent. With five sets of steel samples, on the other hand, of different sizes, cut from ordinary boiler plates, the differences were 1·5 per cent., 0·7 per cent., 7·1 per cent., 4·8 per cent., and 2·9 per cent. respectively. Taking the means in each case as a rough comparison, we have 21·2 per cent. against 3·40 per cent.; and even taking the highest and the lowest of the fifteen steel specimens (although they were of very different sizes), the difference is only 9·6 per cent. It is hardly worth while now discussing how far the complaints as to the non-uniformity of the steel, and the somewhat extraordinary failures which occurred with it every now and then, were well founded; there was probably quite enough truth in them to justify a good deal of hesitation in using steel. But the tables are now fairly turned, and it is hardly too much to say that there is no iron in the market that can hold its own, for uniformity and freedom from failure in working, against the steel now supplied by our leading manufacturers, or that can stand equally well the same strictness and frequency in testing. Mr. William Denny, of Dumbarton, whose firm has been building ships very largely in steel since 1876, says that in one small steamer they are now building of iron they have had more failures than in their whole consumption of about 7,000 tons of steel. He says also that in the case of a number of light draught steamers of iron, which he at one time sent out to India in pieces, they were invariably annoyed more or less by corners of plates coming off, angle irons cracking, and so on, during shipment and transshipment. Last year he built and shipped in the same way six paddle steamers entirely of steel, without losing by breakages anything whatever. Another well-known engineer, who uses both steel and iron on a very large scale, tells me that he hardly ever has to return less than 15 per cent. of his best Yorkshire iron, on account of defects in working, while he absolutely never has any failure with steel. It would be easy to multiply testimony of this kind, but it is probably unnecessary to do so.

Two matters in connection with the working of steel have demanded and received special attention from engineers, but the importance of both is reduced to a minimum in the cases of most importance to architects. These two points are:—(1) the effect of punching upon the material; and (2) the necessity for annealing it after working. Our present experience makes it possible to say very distinctly that mild steel, which has not more than about 30 tons per square inch tenacity, is not more injured by punching than ordinary wrought iron, and *less*

injured in the case of thin plates, say up to half-inch thick. With material of this quality, therefore, no special allowance has to be made for weakening by the punching of rivet holes, beyond what is made in dealing with wrought iron. With the harder qualities of steel, such as are often used for rails, having a tenacity of about 40 tons per square inch and containing about 0.4 per cent. of carbon, there is no doubt a proportionately greater loss due to punching; and—what is still more important—the local strains induced by the operation of punching have the effect, sometimes, of originating a fracture which, when once started in this way, may readily extend itself. This difficulty can be got over in either of three ways, viz.:—(1) by annealing the plate after punching; (2) by drilling the holes instead of punching them at all; or (3) by punching the holes smaller than the intended size, and then riming them out to the full diameter. The first method has the special disadvantage that, as we shall see immediately, it inevitably reduces the tenacity of the steel. The second method is no doubt a complete remedy, although a somewhat expensive one in many cases. The third method is also a complete remedy, and is now very largely used, the injury done by punching being confined—as is shown by a very great number of experiments—to a thin zone of metal, perhaps 1-16th of an inch thick, round the punched hole. If this strained zone be removed, the metal resumes what may be called its molecular equilibrium, and the remaining metal is as strong as it would be were the hole drilled entirely,—as strong, that is, as an equal area of the solid plate.

The effect of annealing is to reduce very materially the tenacity of mild steel. When possible, therefore, it is preferable to avoid the necessity for using the operation. The reduction of strength varies of course with the hardness of the material, but it may be from 10 to 20 per cent. with such qualities as are quite commonly in use. In the case, therefore, where the material is weakened by punching, it is clearly better to rime out the punched holes in the way just mentioned, than to punch them simply and then anneal the steel. The latter method certainly destroys the local strain and makes the material safe, but only at the expense of a very considerable reduction from its proper and original strength. In cases where angles have to be bent, or plates flanged, it was for a long time found or thought to be necessary to anneal the material after working it. Whether it is owing to the more uniform nature of the material with which we are now supplied, or to the greater familiarity of our workmen with its manipulation, or to both causes combined, most engineers now find that their forgings are quite as trustworthy before as after annealing, and are dispensing with the process entirely for the milder qualities of steel.

And now as to the *strength* of such steel as is available for constructive purposes. Out of the great number of qualities of mild steel which are made we may indicate two classes as being of special importance. The first of these is the very mild steel which is accepted by the Admiralty, Lloyd's, and the Liverpool Underwriters for ship-building purposes. The Admiralty limits for tenacity are 26 and 30 tons per square inch, Lloyd's limits are a ton higher, and the Liverpool Underwriters a ton higher still, or 28 to 32 tons per square inch. All three, therefore, admit steel which lies between 28 and 30 tons per square inch, the first two requiring also the ultimate extension of the piece before fracture to be not less than 20 per cent. in an 8-inch length. Such steel requires practically no annealing, and, as has been mentioned, is not more injured by punching than wrought iron, and in many cases less. The regulations mentioned all refer to steel for ship-building purposes or for boilers, where the metal has to undergo a

great deal of heating and working, and the non-admission of stronger material is due to the fact that it is more difficult to work and less certain after it is worked.

The second class of steel having special importance for constructive purposes is that which has a tenacity of about 10 tons per square inch more than the former, or about 40 tons per square inch. It is of course much harder and considerably less ductile, and much less suitable for places where much work has to be done on it. But it can be obtained just as uniform in quality as the milder material, and its superior tenacity gives it great advantages where it can be used substantially in the form in which it leaves the rolling mill. It will extend about 10 to 12 per cent. in ten inches before fracture.

I have placed upon the table several samples of each of these qualities of steel, and upon each is marked its ultimate extension and breaking load; and in several cases also its modulus of elasticity.* These samples have been tested in the machine in my laboratory at University College. None of them have been made specially for testing, and they may be taken to represent fairly the material which is in the market, in the two classes of which I have spoken. To compare with them I have placed beside them some samples of common iron, such as is used in ship-building and bridge work, and marked upon them also the particulars just mentioned.

The requirements of the architect in the way of material are much simpler and more easily satisfied than those of the shipbuilder or engineer. The ironwork used in buildings—in such buildings, that is, as are not pieces of engineering rather than works of architecture—is in general either in the form of rolled joists or of riveted girders, consisting of plates and joists or plates and angles. The joists are used practically as they come from the rolls,—cut to lengths, but not generally punched, any holes there may be in them being commonly drilled. This is a case, therefore, in which the question is not complicated by any considerations as to difficulties of working, and so forth, for the material has no working to undergo. There seems no reason why the harder steel—36 to 40 tons tenacity—should not here in many cases take the place of iron. Its use, strength for strength, would probably be considerably cheaper than that of iron. There has hitherto been very little demand for rolled joists in steel, and there is some difference of opinion on the part of those most competent to judge as to the relative difficulty of rolling them in steel and in iron. At the present moment, however, one if not more of our largest firms are rolling steel joists at very much the same price as that at which firms of equal standing are rolling them in iron, a price perhaps 30 per cent. in excess of what is paid for Belgian joists. The difference of strength, in favour of the steel over the latter, would probably be about 80 per cent., and over English (iron) joists perhaps 60 per cent. In either case there would be a large balance of economy in favour of the stronger material.

The case of riveted girders is somewhat different. There we have to deal with punched plates and angles, and not uncommonly with some bending and other working. As a mere matter of fact I do not doubt that riveted girders of the harder steel, in the making of which all precautions had been entirely omitted, would not contain nearly such serious defects as are often found, and thought nothing of, in wrought iron girders, although doubtless a great deal

* The Paper was also illustrated by numerous wall diagrams, showing in detail the construction and arrangement of the various apparatus described.

more would be heard about them. At present, however, and until the class of workmen concerned becomes more accustomed to handling the material, its use requires a good deal of judgment, and in many cases the milder and less strong steel is to be preferred. For this material Lloyd's Register allows a reduction of scantlings in all parts of ships, built under their regulations, of 25 per cent., and there is no doubt whatever that this does not err on the side of rashness. Compared with such material as I have frequently seen in girders for buildings, a reduction of 30 to 35 per cent. would be fully justified. Whether or not this would pay would of course depend on the relative prices of steel and iron angles and plates. At present the former are about 40 or 50 per cent. in excess of the latter, but the ratio varies from time to time.

In the case of such structures as iron bridges and roofs it may be safely said that a reduction of 25 to 30 per cent. in weight can be made by the use of steel; but its advantages in these cases, which belong perhaps rather to the engineer than to the architect, are so well known that I need not enlarge on them.

The much greater ductility of mild steel than of iron has sometimes led to erroneous notions as to the relative *rigidity* of the two materials for structural purposes, which it is worth while mentioning. The modulus of elasticity of a material is inversely proportional to the amount which a bar of given size extends under a given load, and this modulus is distinctly *larger* for mild steel than for iron. The extension, therefore, up to the limit of elasticity, is *smaller* in the steel than in the iron. The actual working extension of the steel will therefore be less than that of a similar bar of iron. These extensions are of course very small, and they are indeed only accurately measurable by very special apparatus, but are nevertheless the only extensions which ought to occur, or do occur, in practice. That a piece of mild steel 10 inches long will extend, before it absolutely breaks, twice as much as a similar piece of iron, is a matter of interest only as showing the extensive ductility of the metal, and not in any way as a fact having practical application to design, or to conditions under which we ever wish to place any of our structures. The difference between iron and such steel as we are speaking of, so far as rigidity is concerned, may be summed up briefly by saying that, up to the load at which the iron begins to be sensibly stretched or bent, the corresponding distortion of the steel is *less* than that of the iron; that, with further additions of load the steel still remains elastic, while the iron is greatly and permanently strained; and then lastly, that at greater loads still, and long after the iron has broken, the steel continues its deflection or extension, which, before its breaking point is reached, greatly exceeds the utmost which the iron could reach without fracture. In several cases this fact has been the saving of steel ships, and in cases where iron ones must have gone to the bottom, as for instance in the recent instance of the *Rotomahana*, which struck on a rock last New Year's-day, and about which her owners say that, "there is little doubt that had she been of iron such a rent would have been made in her that she would have filled in a few minutes. A number of frames were set back by the force of the blow, the bulkhead was bulged and the plate was corrugated, and yet there did not appear one crack anywhere." The battered plate was taken out, placed in a furnace and heated, and then hammered back into shape and found uninjured, all the rivet holes coming in again; the same was the case with the frames, and nothing whatever had to be renewed. The material used in this case was the 30-ton steel of which I have already spoken.

I have already spoken incidentally of the tests, enforced by the Registry Societies and others, in connection with the steel they permit to be used where work is under their control. No doubt in some cases the testing is irksome and causes inconvenient delays, but its advantages probably outweigh small troubles of this kind; and it may safely be said that had it not been for these tests, and the rigid way in which they have been enforced, we should still be very far from having the splendid material which is now ready to our hands. I cannot therefore, suggest that steel should be used without testing as yet, and the question arises how best this ought to be done. The tests commonly enforced are of three kinds:—(1) the tenacity of the steel must lie between certain definite limits; (2) the samples tested must have a minimum percentage of extension, in a specified length, before fracture; and (3) sample strips, heated to a low cherry red and cooled in water at 82° Fahrenheit, must stand doubling round a curve whose radius is not more than one and a half times the thickness of the strip. The last mentioned test is that known as the "temper test."

All the tests are made upon sample strips of (commonly) from 0.5 to 1.0 square inches in sectional area, cut from the plate, bar or angle as the case may be, the strips being generally of the same thickness throughout, parallel for a length of 8 or 10 inches in the centre, and being wide at the ends where held in the machine. The tests are made by preference at the maker's yard, in presence of the inspector, doubtful or special cases being sent to some independent testing machine. In the case of large orders not less than 2 per cent. of the number of plates, &c., have to be tested in this way, but not a few of our chief steel-makers test for their own satisfaction, both chemically and mechanically, samples from every blow or from every run.

Granting that it is advisable to continue the carrying out of tests, and, if so, that these tests should be realities and not mere forms, it is certainly advisable that some method of this kind should be substituted for the present plan of testing girders whole. At present it is frequently specified that a certain percentage of the rolled joists or other girders about a building should be tested up to loads equivalent to those given in Shaw's Tables (which correspond to a maximum stress of six tons per square inch in the material), and should return to their original forms without permanent set, and this deflection test is the only one carried out. When it is remembered that it is not easy to measure a small permanent deflection, say $\frac{1}{16}$ th of an inch, with certainty on a 20 ft. joist, with such means as are commonly used in the yard, it will be readily understood that this test cannot be very rigidly enforced under ordinary circumstances. But even if it were it is not a satisfactory one, for it is one which will be passed by almost any material,—very common iron equally well with excellent steel,—and affords no clue whatever, as a test ought surely to do, to the properties of the material used. It would, I venture to think, be very much more satisfactory, and probably not a whit more expensive or troublesome, if the tests specified were made more like those adopted by the Registry Societies. The temper test, however, can be hardly ever necessary for architects' purposes and might be altogether omitted. The ultimate extension test is used as being an indication of the difficulty of the metal. It is certainly only a rough indication of this; as a fair criterion we ought rather to know the maximum extension before the material begins to give way locally. This, however, is somewhat more difficult to measure, and for the present it is perhaps as well to be content with the easier though rougher test. It would be sufficient to specify that one out of (say) every ten joists or angles should be supplied 18 inches more

than the ordered length, the extra piece cut off, and two strips cut from it (one from the web and one from the flange in the case of the joist) tested for tenacity and extension. The limits fixed might be, according to circumstances, either 28 to 32 tons tenacity per square inch, and 20 per cent. extension in 10 inches, or 38 to 42 tons tenacity and 12 per cent extension.

There is just another matter to which I may allude. There is one direction in which, I am sanguine, the next few years will see very great strides made, and that is, in the use of mild steel castings direct from the furnace. The difficulties of obtaining sound steel castings, especially with thin metal or with much coring, have been very great, but many of them have already been overcome, and others are fast yielding to the determined attacks of the manufacturers. Even now it is possible to obtain, at a price far below that of heavy forgings, steel castings having nearly double their strength,—castings which are of course as malleable and weldable as the rolled metal of which we have been speaking. In the engineer's and the shipbuilder's work it does not require great prescience to foretell for these castings the greatest importance; for use in buildings they will probably have fewer applications. It is not unlikely, however, that they may often replace cast iron in cantilevers and brackets, with enormous advantage as to strength and trustworthiness, and also perhaps as to appearance.

This Paper has been written with the object of placing before the Royal Institute of British Architects, as far as it has been in my power to do so, an outline of the principal methods by which mild steel is at present prepared, and the qualities which are to be found in this material. I have endeavoured to confine myself to a statement of facts, not entering upon any discussion as to whether or not,—having this material ready to hand,—architects would be wise to follow engineers in their liberal use of it. Among the members of my own profession it has met with the most cordial welcome, and is already used, both in structures and machines, continually and on the largest scale. I am not without hope that before long we may see it taking its place in architectural as freely as in engineering construction, and with as beneficial results to all concerned.



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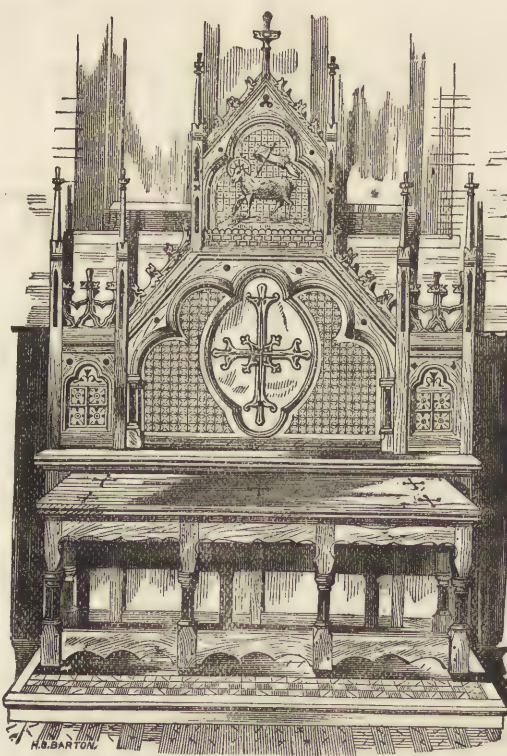
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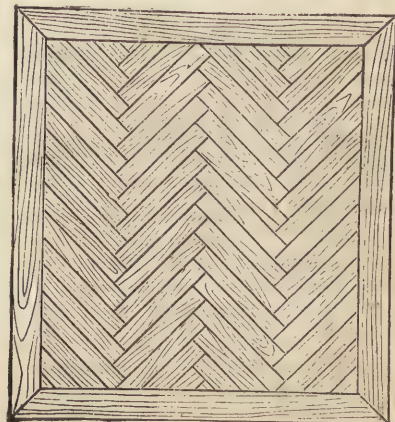
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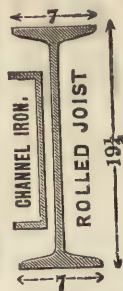


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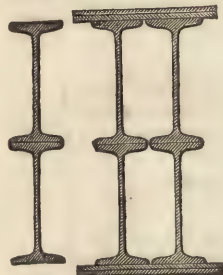
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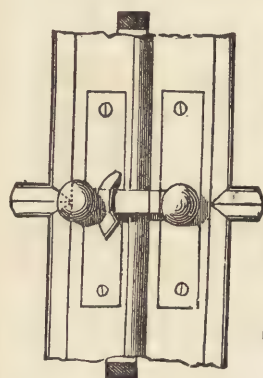
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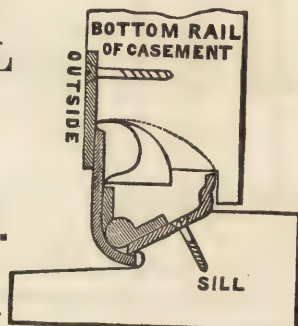
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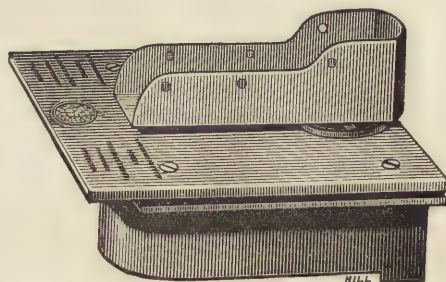
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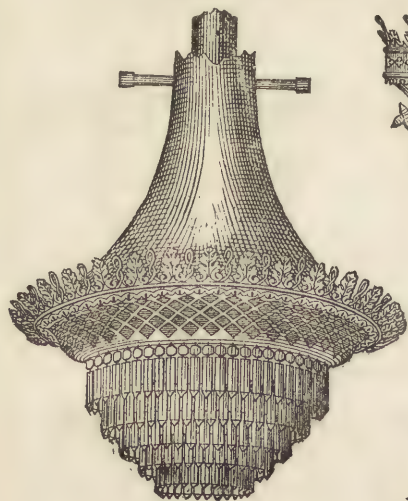
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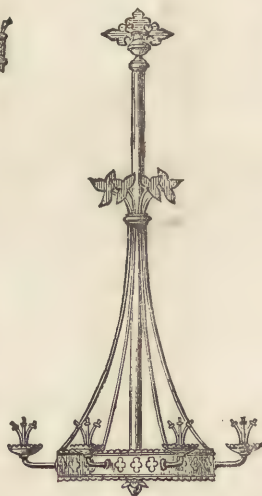
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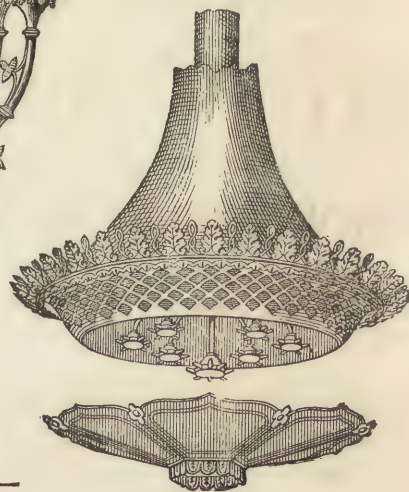
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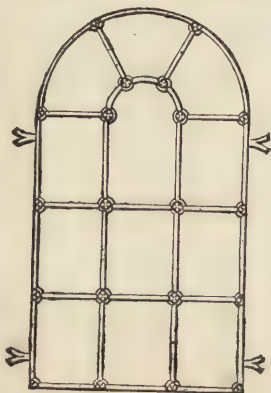
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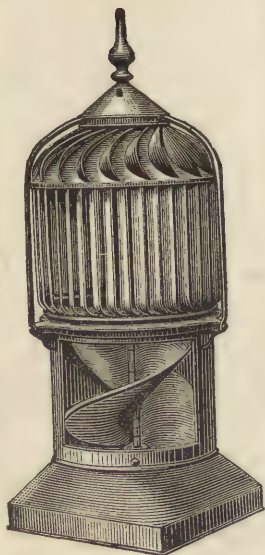
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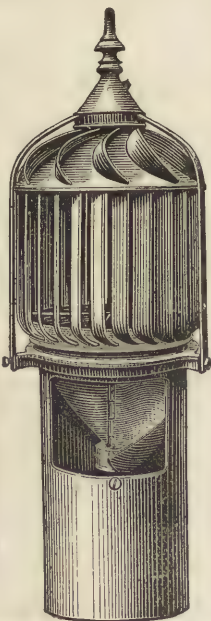
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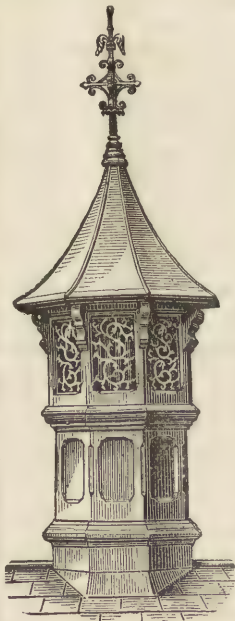
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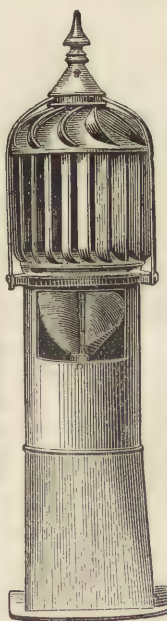
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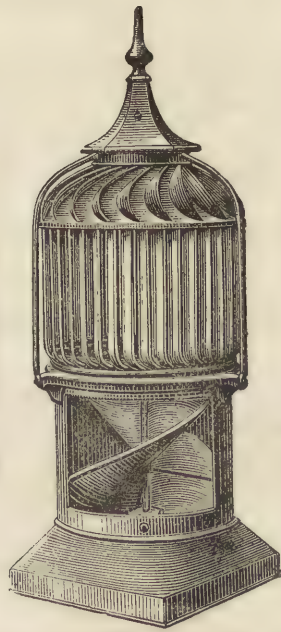
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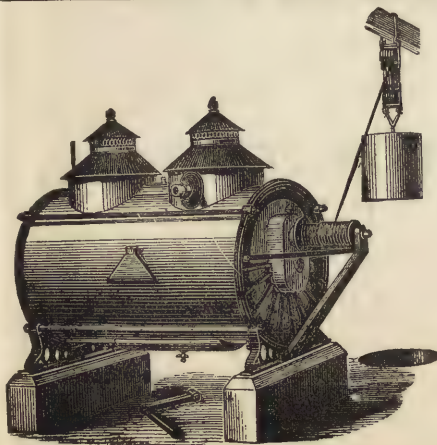
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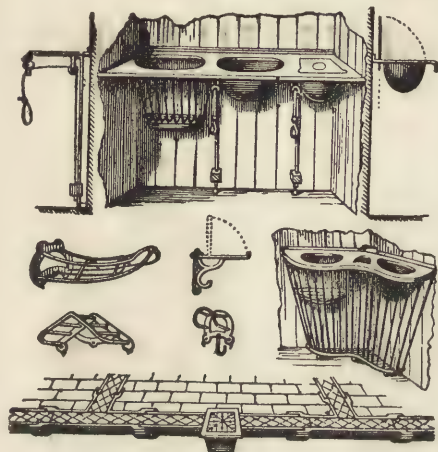
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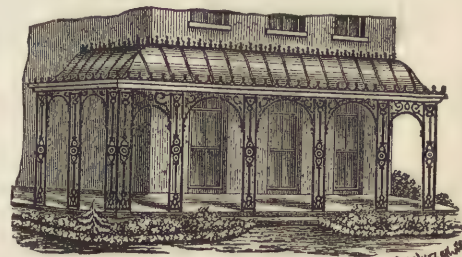
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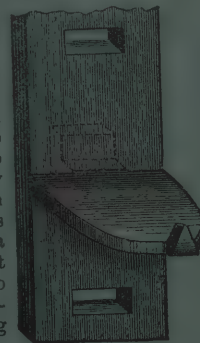
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NOTICE TO MEMBERS.

At the Ninth Ordinary Meeting, to be held on Monday next, the 24th inst., WILLIAM WHITE, F.S.A., *Fellow*, will lead the ADJOURNED DISCUSSION on IRON AS A MATERIAL FOR ARCHITECTURAL CONSTRUCTION (Paper by JAMES ALLANSON PICTON, F.S.A.), and "MILD STEEL" AND ITS APPLICATIONS TO BUILDING PURPOSES (Paper by ALEX. B. W. KENNEDY, M.Inst.C.E., Professor of Engineering at University College, London).

* * See the Opening Speech on these subjects by Dr. C. W. SIEMENS, F.R.S., *Hon. Associate*, accompanying this Notice.

A Communication respecting the Special Committee on ARCHITECTURAL COMPETITIONS, appointed by the Institute, will also be made to the Meeting.

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No. 9.

TITLE OF PAPER.	AUTHOR'S NAME.	
I. Opening Address	John Whichcord, F.S.A., <i>President</i>	Dec. 1st, 1879
II. Frederick Pepys Cockerell: a Memorial Sketch	Anonymous	Dec. 15th.
III. Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S., <i>Hon. Assoc.</i>	Jan. 12th, 1880
IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.
„ Adjourned Discussion on ditto	Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> , Professor Kerr, <i>Fellow</i> , and others:	Feb. 9th.
V. Portland Cement	Henry Faija, Assoc. M.Inst.C.E.	Feb. 23rd.
VI. The Polychromatic Decoration of various Buildings	John Pollard Seddon, <i>Fellow</i>	April 5th.
VII. Iron as a Material for Architectural Construction	James Allanson Picton, F.S.A.	April 19th.
VIII. "Mild Steel" and its applications to Building	Prof. Alex. B. W. Kennedy, M.Inst.C.E.	
„ Discussion on Iron and "Mild Steel"	Dr. C.W. Siemens, F.R.S., <i>Hon. Assoc.</i>	April 19th.

SESSIONAL MEETINGS: MONDAY EVENINGS.

1880 MAY 24 1880 JUNE 7§
§ Presentation of Royal Gold Medal.

NOTICES of the PROCEEDINGS are published on the Thursday morning *following* each Sessional Meeting, and the current number of the TRANSACTIONS is published on the Thursday morning *preceding* each Sessional Meeting.

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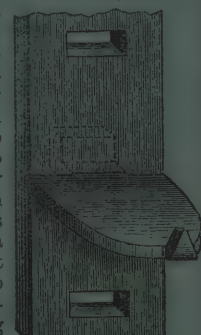
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THE DISCUSSION.

DR. C. W. SIEMENS, F.R.S., *Hon. Associate*—I am sure I cannot do less than congratulate you, Mr. President, and the Institute of Architects upon the interesting and valuable Papers to which we have listened. Mr. Picton, in surveying the whole question of the application of iron and steel to architecture, appears to have taken such a broad and enlightened view of the subject, that I hardly know what to add. Professor Kennedy has dealt more particularly with steel, the latest development of iron as it may be called, and with its preferential merits to iron; and as my name has been connected with one of the processes now largely used for producing this material, I may be expected to offer a few remarks chiefly with reference to the properties of steel and its applicabilities for architectural purposes. Steel is a material, which, as Professor Kennedy very correctly said, has not been well defined. We call steel the material of which watch-springs and cutting tools, needles, &c., are made, and we all know it is very remarkable for its hardness, its great elasticity or rather, I should say, its high limit of elasticity, and also for its brittleness the moment that limit is exceeded. We call steel the material now used largely in railway structures, both in producing wheel tyres and the rails upon which they run. This material is remarkable for great strength coupled with a sufficient degree of toughness to resist very heavy blows, and we now call steel the material which exceeds even copper in ductility, stretching as it does 25 per cent. before breaking. Yet I am in favour of continuing the appellation of steel in speaking of all materials consisting mainly of iron, which are malleable and have been produced by a process of complete fusion. It is to this circumstance of complete fusion that the superior uniformity and the certainty of character of the steel of the present day depends. If we follow the production of wrought iron through all its stages we almost wonder how even such uniformity of strength and character is produced as we find it to possess. In puddling iron the workman produces about one cwt. of metal that has been massed together from a semi-fluid condition, and the nature of which depends upon his skill, the temperature of the furnace, and other variable conditions. The consequence is that one ball is never quite similar to another. One may be what is called young iron, and another is more matured when it leaves the furnace. The young iron will, after consolidation by hammering and rolling, show a crystalline fracture, and the other more entirely decarburized material will possess a fibrous texture. In order to harmonize the differences in the character of the iron in successive balls, the process of re-mixing or packeting is resorted to, which consists in welding together bars produced from different charges, and rolling them anew. Thus by very careful treatment the inequalities naturally appertaining to puddled iron may be reduced, and iron of high quality, such as Yorkshire plate, may be produced; but such care is not always taken and hence arises the uncertain character of the iron of commerce. Even the best commercial wrought iron is not pure iron, but an agglomeration of that metal with cinder, as may easily be seen by viewing a section of a bar through an ordinary magnifying glass, and not unfrequently with more hurtful substances such as sulphur and phosphorus. In producing steel, however, and particularly in producing the steel now used in engineering and architecture, a mass of some ten or twelve tons may be seen in the furnace in a state of perfect

fluidity, in which state it is tested by means of samples both as to its chemical and mechanical condition. It is thereupon run out into a ladle and from that ladle into ingot moulds, and all we have to do afterwards is to give it the particular form or shape required for our purpose. It is therefore nothing more than natural that a material so produced should be much more uniform and trustworthy than the iron of former days. There is, however, still a prejudice—I cannot call it by any other name—in the minds of many of the users of these materials, because the steel of former days was of an uncertain nature, and occasionally gave way when least expected. Professor Kennedy has sufficiently alluded to the causes of this, and I have no doubt but that very shortly this idea will be got rid of entirely, and steel will be used in lieu of iron for a great many purposes to which it has as yet been unapplied, and that it will be trusted to a higher limit of its strength than has hitherto been allowed either by the Board of Trade or by the Insurance Companies. The advantages of steel as a material to be used in architecture, I would consider to be the following:—For purposes where boldness and grandeur of outline are essential no material can rival steel; when we want to bridge a third of a mile in span, or to construct a roof or dome of enormous size, there is no material that can serve our purpose like steel; if the object is simply to get tensile strength, without subjecting the material to cross strain, as is the case in the chains of a suspension bridge, the use of steel wire enables us to attain to limit of strength exceeding 100 tons per square inch, or as much as five times the tensile strength of wrought iron. The chains supporting the great American suspension bridges across the Falls of Niagara and across the Hudson River at New York are constructed of this material, and in the latter case 120 tons per square inch is the breaking strength to which the wires are tested before approval. If, instead of wire, links or bars are used in the construction of bridges subject to continuous strain, the breaking strength (which is really optional, being dependent upon the percentage of carbon admitted into the material) may be conveniently fixed at from 40 to 50 tons per square inch, or say twice the strength of wrought iron. This same material lends itself best for rolling girders to span large openings, and it will be readily conceived that, although the absolute strength of such steel is only twice as great as that of iron, the girders themselves, if of considerable length, may be reduced in section in a much greater proportion as compared with iron, because a considerable portion of the duty of a long iron girder consists in its having to carry its own weight. By reducing that weight to a half in taking advantage of the extra strength of steel, a greater proportion of the total strength becomes available for carrying load, which latter being a fixed quantity renders a further diminution of scantling possible. It is in consequence of this compound effect, resulting from the use of high-class material, that its great advantage in large structures arises, and it is difficult to assign the limit of size which skilful treatment may not accomplish by its use. These, however, would be exceptional instances, and the more important question after all is: How does steel compare with its old rivals, iron and wood, in ordinary construction? I would venture to say that the use of steel in certain portions of ordinary buildings is not only better and safer, but absolutely cheaper than the use of such a material as wood. In using steel girders instead of wooden beams in the construction, for instance, of a ceiling, what is the comparison as regards efficiency and cost? The flooring, supported on steel girders, would be more permanent, being both fire-proof and not subject to gradual decay; it would, moreover, if

made as rigid as a wooden flooring, be four to six times as strong when subjected to exceptional loads. As regards price, granting the material would be dearer, we should have to take into our calculation an element which is not at once apparent. Whereas the depth of wooden beaming of sufficient strength would be, say, twelve inches, if constructed of steel a depth of seven or eight inches would amply suffice; and if we were to repeat this, say five times in a house, a total saving in height of two feet would be the result. Now comparing the cost of the cubical contents in the structure built in the two ways, we should find that in a house of an area of thirty feet by sixty, in taking the price of construction of one cubic foot of capacity at 1s. 2d., without taking into consideration fittings and ornamentation, we should save £210, to be placed to the credit of the steel girders. If allowance were made for this or even half of this it would be found that the steel girder would probably be the cheaper construction of the two. I may mention here a case with which I had to deal in a small way a year or two ago. I have at my house in the country a terrace, and beneath that terrace a billiard room; I wanted to lower the terrace six inches and to raise the ceiling of my billiard room at least a foot. The billiard room had been constructed according to ordinary practice. I managed, by putting steel girders over this billiard room (which was about seventeen feet span), by filling in between girder and girder with cement and covering it with the same sheet of lead that had formerly been used, to save the eighteen inches I required. The result was a perfectly dry room of increased loftiness, whereas before I had considerable difficulty in keeping the water out. This simply shows how, by the use of the stronger material, structural advantages, besides saving in cost, may be obtained. But it has also been reproached against iron that it is not fire-proof. I have heard Captain Shaw say he liked houses with wooden beams and columns, because he knew exactly when they would give way, whilst this was not the case with iron. The remark is no doubt the result of very extensive experience, but I expect that it has arisen through the use of cast iron. Now cast iron I should think is a very unsafe material to be used in architectural structures. You can never know with certainty whether the iron is sound throughout, when put in the shape of a column or girder, or whether there are not unperceived cavities within the shell that make it unsafe. Another danger is that in case of fire cast iron, when heated partially, is apt to crack, and the Fire Brigade would receive no warning as to when the building would give way. But in using steel a very different condition of things obtains. Steel is produced at the highest temperature attained in the arts, and it sets or solidifies at a temperature far exceeding that reached in a burning house. Therefore, although the structure contains this material in parts where strength and solidity are required, it would be improbable that any portion of the fabric would be heated, in case of conflagration, to a temperature sufficient to make it yield on account of that temperature. The temperature would depend upon the amount of combustible material accumulated at any one place, and by the employment of steel instead of wood in the structure the quantity of combustible material would be necessarily much diminished; it would be reduced in fact to furniture and stores, and it is probable that a conflagration would remain confined within very narrow limits. If by a concentration of flame the heat should nevertheless reach a high point in any portion of the building, the steel when heated to redness will certainly deflect to an enormous extent before giving way, and the same indication which the Fire Brigade

men receive in the case of wood they would have in probably a still greater measure in dealing with steel. But an almost complete protection of the steel employed in structures would be obtained by constructing the floors of girders filled in between with plaster or cement, a method which is more largely resorted to in France and other portions of the Continent than in this country. In employing steel in the construction of columns the metal may be conveniently rolled in the section of a cross and be enclosed in a casing of plaster or cement, which latter will in that case fulfil the double purpose of protecting the steel against accession of heat and of lending itself to such structural effect as the architect may desire to produce. In making large girders of steel, riveting has to be resorted to, and the quality of steel that should be used for such purposes differs widely from the harder and stronger description of material applicable for tie rods, rolled rafters or columns. These harder descriptions of steel would lose strength in an extraordinary degree through break of continuity such as is necessarily produced by punching and even drilling for the introduction of rivets. Although steel is immensely stronger than iron, it is more apt to tear from a point of discontinuity, and this liability to tearing action in steel increases with its strength. By careful annealing, risk from this source may be reduced; but annealing itself is a delicate and therefore risky operation, and no work would be safe that depended upon its due accomplishment. The steel maker of the present day is not at a loss, however, to supply a material combining extraordinary toughness with a strength still greatly exceeding that of iron. This "mild steel," which has recently nearly expelled iron from naval construction, has an absolute strength of about 30 tons per square inch, but its toughness is such that if a bar of 8 inches in length is subjected to increasing strains it assumes a length of 10 inches before giving way. Nor is this toughness dependent upon previous annealing; on the contrary, this mild steel may be heated to redness and cooled suddenly by plunging it in water, without losing its yielding property to any great extent. Although the absolute strength of this material does not much exceed that of best iron, its superiority consists in its uniformity and power of yielding before breaking, which makes it a safer material to be used when weighted even to a point nearer its elastic limit than it would be safe to go to in dealing with iron. The Board of Trade have fixed upon six tons and a half as the weight allowable per square inch of steel in bridge work, instead of five tons, the weight allowed for iron, but this rule, which makes no distinction between steel and steel, will in all probability be yet considerably modified in favour of the new material. It has been mentioned in Mr. Picton's Paper that iron, when applied to architecture, has very often been hidden in order to obtain its strength without acknowledging its use. That it could be worked into elegant shapes he proved by the productions of mediæval times, but it appears that this art of working in iron has been—if not abandoned—very much less used, and one of the reasons is probably to be found in the fact that, after the introduction of the blast furnace, wrought iron was no longer produced of its former excellent quality, and that there was a difficulty in working inferior wrought iron into those forms which are admired in old churches, gates, &c. But in mild steel we have a material which is above all others capable of being put into perfect form. We have in this material not only the greatest uniformity combined with the greatest strength, but we have the utmost security against accident and breakage, either when loaded in excess or in case of fire, and it is also a material capable of being wrought into the highest artistic forms.

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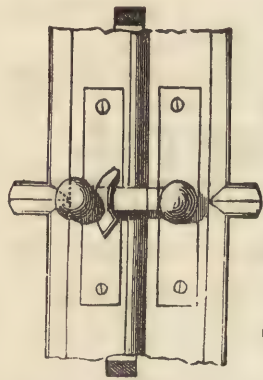
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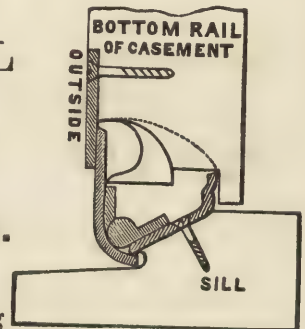
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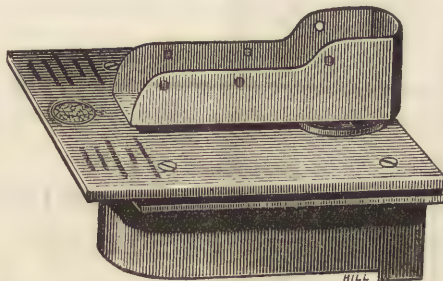
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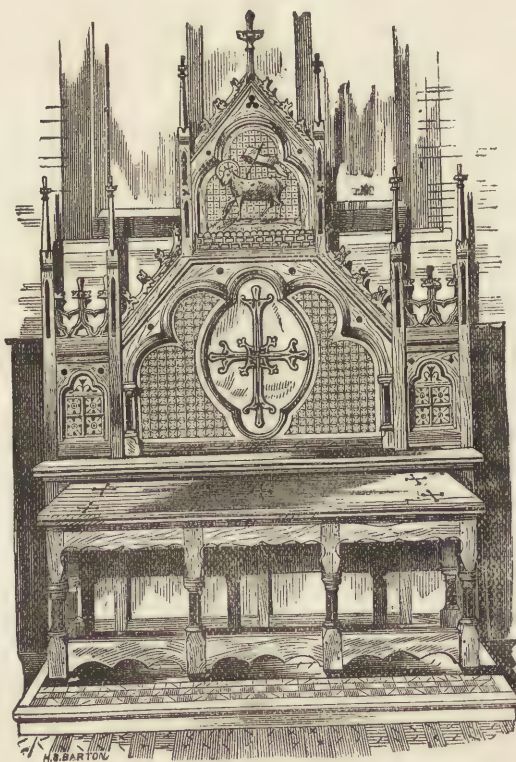
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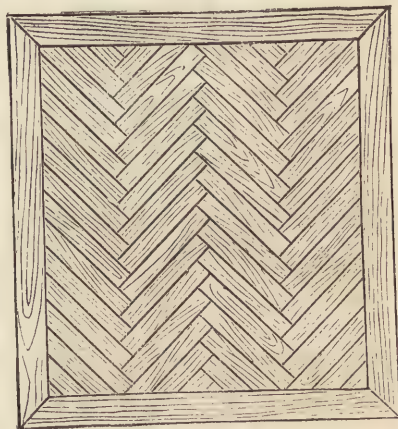
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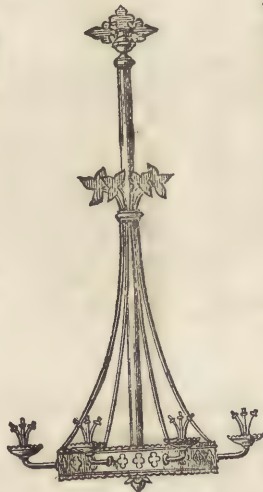
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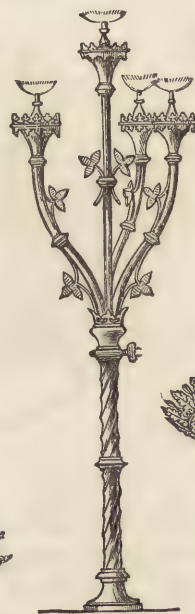
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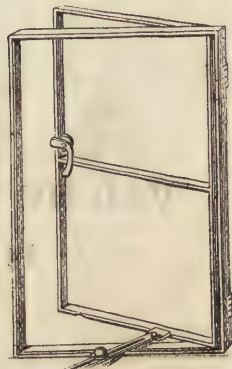
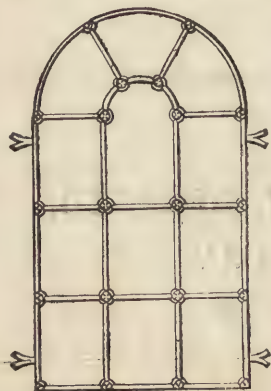
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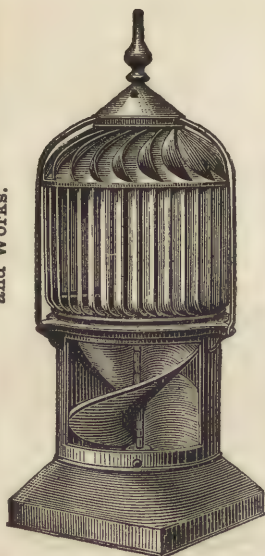
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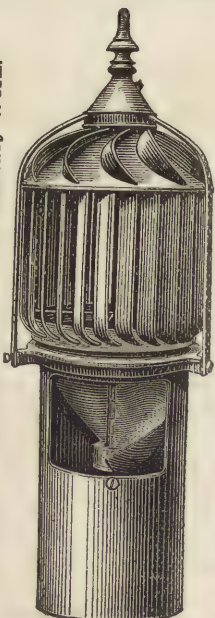
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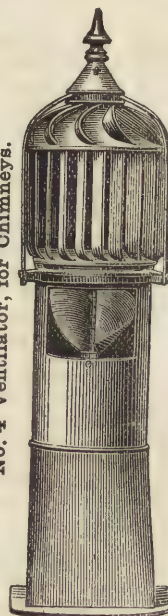
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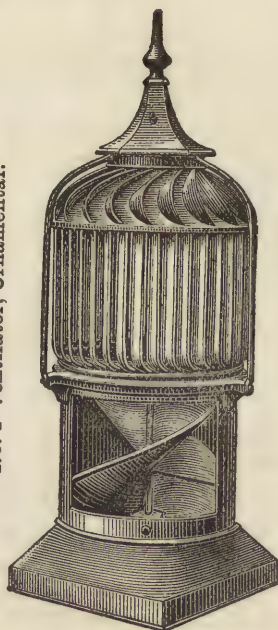
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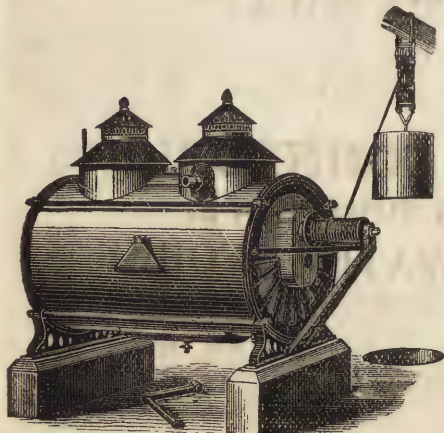
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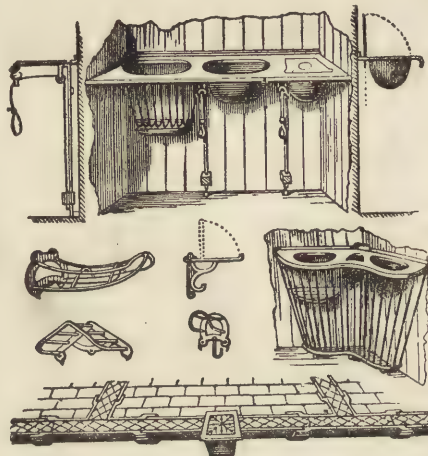
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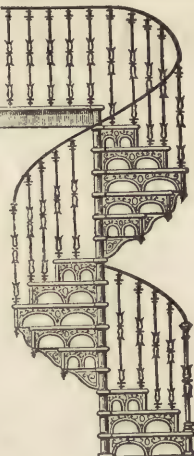
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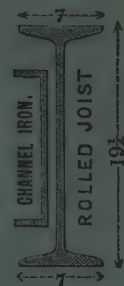


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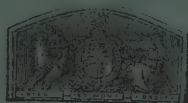
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TITLE OF PAPER.	AUTHOR'S NAME.	
I. Opening Address	John Whichcord, F.S.A., <i>President</i>	Dec. 1st, 1879
II. Frederick Pepys Cockerell: a Memorial Sketch	Anonymous	Dec. 15th.
III. Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S., <i>Hon. Assoc.</i>	Jan. 12th, 1880
IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.
" Adjourned Discussion on ditto	Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> , Professor Kerr, <i>Fellow</i> , and others.	Feb. 9th.
V. Portland Cement	Henry Faija, Assoc. M. Inst. C.E.	Feb. 23rd.
VI. The Polychromatic Decoration of various Buildings	John Pollard Seddon, <i>Fellow</i>	April 5th.
VII. Iron as a Material for Architectural Construction	James Allanson Picton, F.S.A.	April 19th.
VIII. "Mild Steel" and its applications to Building	Prof. Alex. B. W. Kennedy, M. Inst. C.E.	April 19th.
" Discussion on Iron and "Mild Steel"	Dr. C.W. Siemens, F.R.S., <i>Hon. Assoc.</i>	April 19th.
" Adjourned Discussion	William White, F.S.A., <i>Fellow</i> , Geo. E. Street, R.A., <i>Past Vice-President</i> , and others	May 24th.

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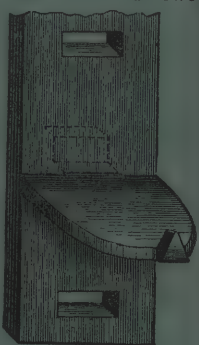
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WILLIAM WHITE, F.S.A., *Fellow*.—The title of the Paper upon "Mild Steel" was not particularly attractive from an architectural point of view; but it proved to be of the greatest interest and importance. Dr. Siemens, in his valuable communication, has pointed out how many details have to be carefully considered in its structural treatment. Many others may suggest themselves. Take the case of that accident on the Great Western Railway. If the tyres of the wheel had been seven in number instead of six my belief is that the accident would not have happened. The theoretical explanation of the force of a wheel is that of a succession of blows in the direction of the radius upon the rails. It is evident that if there is one direct diameter through the whole wheel the concussion, every time that that comes in contact with the rail, is of a very rigid nature; and if space comes opposite space the yielding force is doubled, whereas if you have space opposite a spoke, as you get by an odd number of spokes, the concussion is distributed. And this would tend to greater security and comfort in conveyance. This occurred to me from accidentally noticing, many years ago, an *old* carriage wheel which had an uneven number of spokes, and which caught my eye in a carriage maker's yard. The only explanation of it I could obtain was to this effect, "I can't tell you, sir. All wheels used to be made in that way; but it was given up years ago." I have noticed since many other old wheels of the same form. There can be little doubt as to the fact; and my view was borne out subsequently by a conversation with a bicycle traveller to whom I mentioned it. He said it had occurred to him that a wheel with an uneven number of spokes would last longer and be more secure. He had had several wheels fail (that was before the patent suspension wheel came up), and he had an uneven spoked wheel made which really stood the work. That would certainly be the case with an iron construction.* It is a point which may not be of much value or interest in itself, except as it may lead to the consideration of other details; like that of the liability of the iron to tear, from the punching of a hole, which was so forcibly brought out in these Papers. A remarkable proof of the value of steel as a structural material cannot be better shown than by the fact of the increase in its use, from 50,000 tons per annum, prior to the introduction of the Bessemer process, to 700,000 tons immediately afterwards. The use of steel, moreover, with its increased lightness and greater strength, its wonderful ductility and fitness for fine ornamental work under the hammer, points to the probable course and development of an iron construction, and calls into prominence the true characteristics and nature of this material as applicable to architectural purposes. It points out with still greater force the influence which the use of iron may exercise upon architectural form and design, so ably treated of by Mr. Picton. I only regret that I cannot fully agree with all the conclusions at which that gentleman has arrived. It may be, as observed by him, that the ultimate principle of true architecture is to use the materials within our reach in such a manner as to bring out their capabilities most efficiently for strength and commodity, and to superinduce upon their employment such decorative forms as the nature of the material may suggest. But in true architecture there is much more to be considered; there are other and higher essential principles involved than the mere legitimate use of material and its ornamentation, though these must on no account be wanting.

* I am told that the wavy *curving* of spokes has been resorted to, to reduce the rigidity above alluded to. The danger of fracture by frost would in any case be greatly lessened by either form.—W. W.

Iron has doubtless become, and more and more will become, a most important factor in architecture. But to speak of "iron architecture" must ever be a solecism. To speak of naval or marine architecture on the contrary would be quite legitimate; but this has nothing to do with what we properly call "architecture." Iron construction carried out "as architecture" must fail to be architecture, as I shall proceed to show, not by any means as wishing or intending to depreciate its use and its value in architecture, but only that if, as suggested by Mr. Picton, it should "lead architecture to take a new departure," architecture will indeed depart, by being improved off the face of the earth. Set aside if you please all recognized schools and forms, orders and styles yet developed or invented, and fall back upon the grand central principle of architectural comprehensiveness. Scatter to the winds all previous history and precedent, and begin *de novo* upon the basis of a new material, requiring new methods and new forms of treatment. A new order of things may be arrived at. It may be "ferru-tecture" or some other "tecture," but not architecture. Architectural form, as distinct from constructional form, must, in ironwork, be always harsh and rigid, cramped and limited by the necessities of the material. It is not necessary for me here to point out the unfitness of iron as compared with other materials for general domestic use in our ordinary dwellings; or that, in this sense, it is not the material which we have, or ever shall have, the most ready to our hand,—in the proper use of which the ultimate principle of architecture is supposed to reside; though this unfitness alone would be fatal, as I conceive, to its claim to dominate over other material for the development of a new style. For supposing it eventually to prove the cheapest, most available and most enduring, a great deal more is required to establish its claim as the most perfect, the most architectural, and on other accounts the very best material to meet the requirements of a highly cultivated people in these respects. This, however, I can afford to leave others to deal with. My own aim is to deal with the broader lines of the abstract principle of architectural rather than of structural fitness. Now one chief element in the nature of iron is its great strength, under both tension and compression, in proportion to its bulk. Whereas in architectural form, bulk or its equivalent with breadth and depth and gradation of shadow, and the facility for obtaining these elements at will, are essentials. The proportionable distribution of masses, and the gradations or contrasts of shadow in outline, no less than in detail, so readily and so admirably obtained with other materials, are inconsistent with the nature of the constructive force of this material. Under the use of iron a far greater effect of elegance and airy lightness may be obtainable; but give to iron a real or an apparent massiveness, and you destroy at once its character and its ostensible use. An effect of massiveness and bulk may be obtained by the use of hollow columns and hollow cornices, hollow walls and other hollow work; but we shall then arrive at an uncommonly hollow state of things altogether, under which architecture will be extinguished. Whereas massiveness, as I have already observed, is an essential element in all true architecture; not the mere massiveness of barbarous construction, or of barbarian simplicity, but massiveness counterpoised and kept in check by other qualities and characteristics equally indispensable to give dignity, depth, solidity, repose, beauty to the design. Some of these qualities, inconsistent with the nature of "ferru-tecture," are amongst the first and most impressive elements of architecture; and when we come to form, we equally find the discrepancy between the two "tectures." The art of ironwork admits of the most elegant, graceful, fantastic forms in

fountains and fences, grilles and screens. It admits of a wonderfully extensive application to roofs and floors of large span, for a great variety of useful purposes. For railway stations and bridges, markets and exhibitions, and such like purposes, whether of the present day or of future generations, its utility and necessity must be undeniable; and it may well be allowed to supersede the use of all other material. But this will always be in strict subordination to present useful requirement, to utilitarianism. The very lightness, airiness and expanse of the structure, preclude all idea of some of the higher characteristics of true architecture. Nor is it at all derogatory to the structure of the St. Pancras Station, or any denial of the kind of impressiveness produced by it, to say so: indeed rather the contrary. But call to mind the buildings of any age or nation which have impressed you most, otherwise than as a triumph of constructional skill, and you must acknowledge that they are the furthest remote from anything approaching, in any of their characteristics, to an iron construction. On these accounts I venture to maintain that for all purposes of architecture of a monumental character, for all buildings that are intended to appeal to succeeding generations and stamp their indelible mark upon a highly civilized people, we shall have to look elsewhere than to iron. We must not look to this material for a permanent embodiment of art, nor for the idealization or expression of imaginative or poetic thought. I am well aware that some present would scout the suggestion of a possible connection of poetry or imagination with architecture. They look down from their sublime heights of technical excellence with complacent pity upon the poor misguided creature who would seriously suggest such an idea. I am not, however, going to enter here into the bearing of poetry upon architecture. Still I would suggest that "beauty in decay" will never be immortalized by the poet, when he takes for his theme in after ages the wreck of an iron railway shed. And one amongst the great originators of the present architectural revival—I mean not an architect but a poet, not Sir Gilbert but Sir Walter Scott—lived and wrote just in time to save this generation from what might otherwise have been the natural consequences of an earlier development of the age of iron which we now witness and experience. On the other hand I cannot bring myself to think, with Mr. Picton, that the glories of smithy work "have passed away, or that circumstances have so changed as to prevent a possibility of their return." I am more sanguine as to the future of art. The great staple of commercial enterprise will be necessarily carried out by machinery, which alone can meet the requirements of the enormous demands made upon iron as a constructive material. This need not, cannot, will not supersede the use of iron for more artistic uses; and, whatever may be the perfection of mechanical means for producing a given result, it is only the æsthetic eye and the manipulative power of the skilled workman that can produce the "thing of beauty" in which human intelligence will continue to take delight, or which will maintain its position as "a joy for ever." And now that "mild steel" has been brought into the field, one more instrument has been added to the revival of the metallurgist's art. I suppose you are all aware that the vase on the table is a specimen of steel, hammered up, and a wonderful specimen it is, showing plainly the power that has now been opened up as a means of ornamental work.* I have often wondered at the marvellous durability of the mediæval iron ornamental work, and this apparently without the need of the successive coats of paint applied to modern work, which even thus can hardly

* This vase was lent for exhibition by Dr. Siemens; it was presented to him by Messrs. Schneider, of the Creusot Works, as evidence of what the material produced in one of his furnaces was capable of.

be protected from the ravages of the atmosphere upon it. Modern work has suffered more in thirty years than mediæval work in three hundred. I know that steel is much less susceptible than iron is of rust. Perhaps apart from the superior quality of the iron which the mediæval smiths used for their works, they possessed some process of preparing it specially for their purpose; the compactness of the fibre obtained by the more efficient use of the hammer might do something. For the purposes of the higher forms of art in cast metal, I cannot suppose that even this steel ought to, or will, supersede the use of bronze. Representations of the human form and of animal life are not fitting subjects for a material so liable to corrosion. These are the work not of the art-workman, but of the sculptor, who may reasonably demand a material more amenable than metal for the purposes of moulding his form in the first instance, whatever may be the metal in which it is eventually cast. Full and suggestive as is Mr. Picton's Paper, and valuable as a practical summary of what has been done and is being done in the world of metal, I feel compelled, in reply to his crucial question, not only to doubt but emphatically to deny that "if iron had been equally available at the two periods in question, the genius which designed the Parthenon, or that which soared aloft in the nave of Amiens or the choir of Le Mans, would have been equally successful in the design of a metallic structure"—*for the purposes for which they were designed*. And for other purposes than those for which they were designed, the whole question falls to the ground. My own thanks, however, and those of the Institute, are due to him, equally with Professor Kennedy, for the valuable and interesting Papers with which they have favoured us.

EWING MATHESON, M.Inst.C.E.—I would hardly presume in a meeting like this to discuss the art question of iron with architects, but I would venture perhaps to hint, in respect to the remarks of the last speaker, that there is something to be said on the other side, and perhaps even an iron column—a hollow iron column—may be made a thing of beauty in some future age. In regard to structures, I think that perhaps the condemnation which iron too often merits is largely owing to the method with which it is applied, and that we have not yet had sufficient experience of the most suitable modes of applying those kinds of iron and steel which are available. Even if the debate were confined to the artistic application of iron, there would be more to be said in its favour than we have heard. I think what this Institute heard from Dr. Siemens as to the method of applying steel in structures leads to perhaps more than he mentioned. There is no doubt that the manufacture and application of steel are in a transition state, and there is not sufficient information available either to engineers or to architects regarding the forms in which it can be supplied, to enable them to lay down fixed rules for it. In regard to steel joists, I think I am right in saying that at present they are being made only by one or two manufacturers, and that there are certain difficulties in making them which have hitherto shut them out of ordinary commerce. Architects must not, therefore, too strongly rely upon getting the special forms they want, and the relative cost of iron and steel, as measured by units of strength, has not been accurately determined. There is one thing which I think will limit the use of steel at any rate at first, which is peculiarly interesting to architects, and that is the want of some common Hall mark or brand to tell them they have got good steel. There is nothing in the outward appearance to tell whether it is steel or iron. Steel of good value suitable for structures will bear strains 50 per cent. more than iron, but it is obviously essential that there shall be no doubt as to what the material is. Until the brand

of some eminent manufacturer or some official is put upon steel its use will be restricted in cases where the origin of the material cannot be traced or verified, as would often be the case in purchasing through intermediaries. There is no doubt that many of the iron joists used in England are very bad, and one has, in designing structures, to assume a very low standard of strength. This low quality is largely owing to the fact that a guarantee or test of quality cannot easily be obtained in purchasing small or varied quantities of joists through builders. I think Dr. Siemens spoke of rolled steel or cross-shaped stanchions instead of hollow cast iron columns, but I think it is premature to thus decide between them. Cast iron has functions to perform which no other material yet has filled. It would be fairer to compare cast steel with cast iron, and there are peculiar risks with cast steel of shapes which cannot be hammered. It would doubtless be very convenient if we could get rolled stanchions of a cross section, but I do not think they are to be obtained yet. I would rather recommend, if steel supports are wanted, to have them of hollow form of rolled segments—four or six to the circle—riveted together, as is often done with wrought iron. I think there is a little misapprehension in regard to the use of iron for fire-proof buildings. I do not think there is any difficulty in making fire-proof floors or structures if the building be used for ordinary purposes; but if filled with combustibles, then, unless the precautions necessary in the furnace are taken, you cannot get it fire-proof, and the failure in my opinion is rather due to the treatment or use of the building than in the mode of construction. One of the great drawbacks to the use of iron is that you cannot get durability without continually painting it, especially in modern times, and in large cities, where the atmosphere laden with gas and smoke, is so bad. Effective methods of painting iron are very seldom carried out. In this country the only process by which wrought iron can be preserved is hardly ever adopted—the getting at the real skin of the iron before the paint is put upon it. The way in which joists and girders exposed to the air, but inaccessible to the painter, are deteriorating by rust, will I think, frighten the next generation, who will have a great deal more to do in rebuilding modern structures than is now realized. One of the great arts of iron structural design is to put it where it can be painted, and though it may seem a commonplace thing to speak about, it is without a doubt a most important part of the subject. In regard to the beautiful wrought iron of the Middle Ages, I agree with the last speaker that similar work fails now because of the difference of the atmosphere to which it is exposed. I question if that iron was any better or so good as the modern iron, but the ravages of rust are now more severe. If anyone were to compare the beautiful wrought iron round about the Foreign Office and India Office with the cast iron gates of the Royal Exchange, the difference in the wasting by rust would be noticed. I look very often at the former, and sometimes scrape some of the rust away with my knife to see how it is getting on. In regard to workmanship, if we compare such work with that of past times I do not think we need blush at the comparison. But the fact remains that our iron structures will not last nearly so long in consequence of the atmosphere, which did not affect to anything like the same extent the work of our predecessors.

E. A. COWPER, M.Inst.C.E., President of the Inst. of Mechanical Engineers.—Mr. Picton's Paper is very interesting as giving the early history of some of the various attempts to use iron; but I venture to think there were others of very early date, as for instance, 1 Saml. 13th, 21st and 19th, "Now there was no smith found," "yet they had a file for the mattocks,

and for the coulters, and for the forks, and for the axes, and to sharpen the goads." Again 2nd Saml. 22-35th, "A bow of steel is broken." In reference to the use of coal—pit-coal for smelting iron—I have always believed that the honour of using coal first belonged to Dud Dudley, of Dudley, Staffordshire, and I believe the evidence is complete on that point; he certainly took a patent for the plan in 1638, and struggled hard until he had introduced it. However, I submit that it is not so much with the early history, interesting as it is, that we have to do just now, but with the practical every-day application of iron and steel to our purposes; and I trust it soon will be an every-day use. Professor Kennedy's Paper is, I think, a valuable contribution which brings before the members an outline of the principal methods by which "mild steel" is at present prepared, together with its qualities. I entirely agree with Professor Kennedy as to the uniform good quality of "mild steel," its ductility, strength, toughness and freedom from flaws, bad welds, scoria and scabs, and I certainly consider it the most trustworthy metal we have for such uses as it is adapted for. I hope Professor Kennedy will push the subject much further by future Papers, and conduce much to the use of "mild steel" in its application to building purposes. Mr. Picton's Paper speaks of Iron as a material for architectural construction, and the subject is so large that I will not attempt to do more on the present occasion than touch shortly on the use of cast iron, which I trust will soon be raised to the honourable position of being considered an architect's as well as an engineer's material; it has been a very obedient and hard working servant in the hands of the engineer, and has been a necessity, for the carrying out of many large designs, though I am free to admit, that very often it has *not* been handled in so elegant a manner as to satisfy good taste, whilst it has answered the desired end in point of usefulness. However, so far as my humble opinion goes, I am very sure, that as soon as iron becomes truly an architect's material, it will be treated in such a way as to add greatly to our means of producing structures, which satisfy us in point of beauty, whilst they answer their purpose in point of utility. One way of advancing iron to the position of an architect's material would be to let every architectural draughtsman have handy, at all times, a concise little book of examples, good and bad, for reference. Thus a dozen pages would give as many examples, and some hundreds of dimensions of columns for instance, with their safe loads, the same being of very various diameters and lengths, so as to include even the extremest limits; such a table would at once show a draughtsman without argument, that he must never, under any circumstances whatever, think of casting a column as thin as a *quarter of an inch* thick (though theory would sanction it), and that it must be something altogether out of the common way that required a column to be more than *two inches* thick. With such a book of reference, a draughtsman would be just as well able to use cast iron for a column (always supposing that he took the trouble to calculate roughly the load that would come upon his column) as to use stone or brick, and very often with great advantage in point of appearance, and space gained. The illustrations should show him that in order to get a strong flange, or strong "lugs," to a column, so as to make the fixing anything like the strength of the column, he should gradually thicken up the column in about twelve to eighteen inches of length to about 50 per cent. greater thickness, and then make the flange or "lugs" in proportion to that increased thickness. This would enable large bolts to be used, and would not cause the column to have any undue strains on it, due to difference in the time of cooling, from one part being thick whilst

another was thin. Examples of carved or ornamented capitals should be given, showing how the columns should be cast plain, and the carved work be attached to it, as the labour and expense to the ironfounder is enormously increased, and the work but badly done, when it is insisted on, that the ornament shall be cast on solid; it is, moreover, almost certain to be broken by the time the column is up in place. These are a few of the practical considerations affecting the apparently very simple question of designing a column; there are others, but I refrain from going further into detail, whilst I feel certain, that when the knowledge of iron and steel shall have become as familiar as our knowledge of stone and wood, we shall see the effects in greatly improved public buildings. I will not now go into other forms and conditions of iron, but will mention one bold and successful design carried out in America, namely, that of carrying two large water mains over a river, when the pipes were cast to the curve of the arch of a bridge, and properly jointed together, and made to form themselves two arched ribs, near together, and being firmly braced together they became the bridge. One other use of iron or steel I will just name, as proposed by myself some years ago: it is that of an arch that would of course be in compression in its natural position, and would contain all the lines of *thrust*, whatever they might be, caused by a load passing over the bridge; then I take such arch and invert it, so that it then acts by *tension*, and is a suspension bridge, but with all the lines of strain within its depth, so that it does not deflect or alter its shape more than a girder, and it could be made up to 2000 feet span. I call it the inverted arch bridge.

JOSEPH BERNAYS, Assoc.M.Inst.C.E., President of the Society of Engineers.—I had the pleasure of hearing the Papers of Professor Kennedy and Mr. Picton, and was exceedingly pleased with them, and particularly with Mr. Picton's clear exposition of the development and history of iron. There is one point he specially referred to and that was his desire to develop still further the use of iron in architectural productions, and that set me thinking whether there was any explanation to be given for the reason that iron has been made more use of by the engineer than by the architect, and I will, with your permission, say a few words on this subject. It is an axiom both with the engineer and with the architect that all materials should be used in their natural state, that they should be seen; that there should be no hiding away, except, perhaps, for ornamentation, which is a separate subject, and we know that the architect in perfect architecture gives us the advantage of all materials as they are furnished by nature. But what I may call a distinctive feature of architecture is that it does not show the small details of construction. The architect shows us the columns, the floors, the roofs, everything in its grand impressive outline, but he gives us no bolts, no joints, no ties—nothing of that kind; he likes to keep that out of the way and rather feast our eyes on the grand finished curves. The engineer, on the other hand, particularly when he uses metals, has it as an axiom that after erection he must be able to see, to touch and to get at every detail of the work he has constructed. Take an iron girder that is composed of several pieces—you are supposed to see every tie, strut, rivet, bolt and joint; and if when the structure is finished it gives a view of unrest or unquietness it is with the engineer of no consequence, because he is accustomed to deal with matters in motion, whereas the architect mostly applies all the materials for statical purposes. Therefore, it appears that the line to be drawn should be this: that where the construction necessitates a number of small details, and these are to be shown to the eye after they are erected, such structures should be made and designed and calculated

by the engineer, and where such structures do not admit of small details being shown they properly fall into the province of the architect. I may take as an example that beautiful piece of engineering referred to by Mr. Picton, the St. Pancras Station roof, designed by Mr. Barlow, the distinguished President of the Institution of Civil Engineers. I think if that had to be designed by the architectural profession it would have to be made in such a way as not to show any cross-bars or trellises or tie rods in any kind or shape, because that shows how the thing is put together, and the skeleton, as it were, of the whole is made clear, whereas the engineer is proud to show how the details have been conceived and to contemplate their juxtaposition. In proper architecture all this iron-work would probably have been filled in. The beautiful ribs with their trellises would have been made either solid throughout, or filled in with curved details in unison with the main curves of the ribs, to form grand arches from top to bottom. I can, therefore, fully comprehend why the architectural profession should not take so kindly to the use of those metals for structures of magnitude until the manufacture of iron and steel shall have advanced sufficiently to admit of the production of huge masses of approved shape without necessitating minute structural details.

EDWIN NASH, *Fellow*.—Excuse me for interposing to ask a question relative to the durability of iron structures, for in this room many years ago I ventured to say that iron structures are the most evanescent structures on the face of the earth, and I now wish to enquire of those learned in iron whether wrought iron, when subject to concussion and the vibration consequent upon concussion, has a tendency to part with some of the fibrous character that has been artificially given to it, and to turn back to its natural crystalline condition? For if it be so, then all iron structures which are subject to living loads, such as pass over a bridge, are losing some of their strength day by day.

EWING MATHESON, M.Inst.C.E.—That subject has been very carefully investigated, and I think the conclusion come to by the best engineers is that, if the strain never comes above a certain proportion of the breaking load,—that is, not beyond the elastic limit of the iron,—it would require millions of strains and hundreds of years to destroy any structure such as is made at present. Therefore, if properly designed, railway traffic would have no appreciable effect on a bridge, but the moment the loading gets beyond the elasticity of the iron (about half the breaking strength), then it would very seriously and quickly damage it. St. Pancras roof I should say would last for hundreds of years; practically it is everlasting if kept properly painted.

JAMES N. SHOOLBRED, M.Inst.C.E.—The more extended use of iron and of steel in architecture, as an adjunct to the materials at present employed, would seem to be Mr. Picton's intention in his Paper; he did not propose to replace them, as Mr. William White would make it appear. In order that steel, and particularly "mild steel," should be more generally made use of, two things are necessary: First of all, a considerable reduction in its price; and secondly, that the regulations as to its use, by which we are guided, particularly those of the Board of Trade, should be somewhat less stringent, so as to allow of its greater strength being taken advantage of. The regulation of the Board of Trade allowing but $6\frac{1}{2}$ tons per square inch for steel, against 5 tons for wrought iron, leaves so small a margin that it does not compensate for the difference of cost between the two materials. With "mild steel" of approved quality, 8 tons per square inch, as the limit of the working load, is a pressure which

most engineers conversant with the subject would not consider to be at all excessive. Mr. Picton refers to the general practice, in churches and in buildings generally, of wishing to hide the details of ironwork where they occur. One example may be mentioned where this is notably not the case—the Church of St. Augustin, in Paris. Iron has there been used extensively in the construction and framing of the roof and of the dome, without the slightest attempt at concealment. On the contrary the ironwork, tasteful and effective in design, is brought out boldly. The contracted and peculiar form of the site almost necessitated the church being built in this way; and the result is considered by many architects to be attended with success. It is, moreover, a highly mischievous practice (as has already been referred to by other speakers) to place the ironwork so as not to be readily seen or got at: corrosion may thus be taking place unchecked and unnoticed. Engineering structures generally happen to assume the appearance of long, narrow, thin bands, stretching from one point to another, following the lines of strain, and approaching to straight lines or else to curves of very large radius. The effect upon the eye of this must necessarily be more unpleasant than where curves of smaller radius abound, as in architectural structures; which also present a mass for the eye to rest upon, and which therefore afford a much more pleasing effect. Hence engineering structures in iron and steel are often decried as unsightly; through no fault of the materials, however. The custom still holds favour with some architects, in the design of ironwork, to base their calculations upon the breaking weight of the iron. To talk of the breaking weight of iron and steel is to speak of an unknown quantity, varying most widely, and dependent upon the quality of the material which happens to be employed. The numerous diagrams and extensive tables, which Professor Kennedy has exhibited with his Paper, show how wide is the range in the quality of iron and steel; and, therefore, how enormously the breaking weight varies. It has become the much more general practice to base all calculations upon a safe working strain, in conformity with the regulations which the Board of Trade imposes upon all metal structures that come within its supervision. Reference is made in Mr. Picton's Paper to the new Reading-room at the Liverpool Free Public Library. This has been lately built by the Corporation of Liverpool; and it has been named "The Picton Reading-room." In so doing the desire was to do honour to one who, during thirty years of municipal life, has worked constantly for the intellectual advancement of the City of Liverpool; and who, moreover, is the Chairman of the Library and Museum Committee, and has been so ever since it was formed, more than five-and-twenty years ago. This circular Reading-room stands between, and connects, the Brown Museum and the Walker Art Gallery: the munificent gifts of Sir William Brown and Sir A. B. Walker. It thus completes, with St. George's Hall just in front, a beautiful series of public buildings devoted to intellectual culture, such as few towns possess. The Reading-room was designed and erected under the direction of Mr. Sherlock, your Fellow, who is also the architect of the Walker Art Gallery. The design of the ironwork used in its construction has been referred to by Mr. Picton as being of a peculiar character; no column or support of any kind is used in this circular building, of 100 feet in diameter, to support either its flattened dome or the floor which divides the two rooms, which occupy its entire height. The firm of Messrs. Bergheim and Co., to whom Mr. Sherlock entrusted the manufacture of the entire of the ironwork, have, in carrying out Mr. Sherlock's requirements, presented an original and elegant form of

construction in the wrought iron framing of the dome. It consists of sixteen curved ribs, of open lattice work, with their upper ends resting upon a circular girder 24 feet in diameter; which forms also the central and sole opening for the admission of light. The lower extremities of the ribs rest upon the circular wall. A ring of rolled joists and cross tie-bars of iron also connect the ribs with each other in various directions. The exterior covering of the dome is Belgian zinc laid on boards, and about 55 tons of wrought iron are used in this construction. The lower room, as originally intended, would have been of moderate height, and a number of columns were to aid in carrying the floor above. When, however, it was decided to make use of it as a lecture hall, with a deep well in the centre, it became evident that columns or supports of any kind would be objectionable. The arched or vaulted form of construction seemed to the architect to be best suited to the altered circumstances. He, therefore, invited the speaker to co-operate with him in carrying out a suitable design in iron. Wrought iron was the material selected, after mature consideration, for its construction. "Mild steel" was reluctantly abandoned for the reasons stated at the commencement of these remarks; and also cast iron did not present sufficient advantage in point of economy to compensate for the uncertainty inherent in its constitution. The framing consists of four elliptic arches, or rather of eight half-arches, connected at their point of intersection by a cast iron key common to all. Light horizontal girders, placed where necessary, are so arranged as to support the wooden floor, and to convey its weight to the arched ribs. Eighty-five tons of wrought iron are contained in this framework. The floor has been designed to carry, apart from the weight of materials, a load of 450 tons without exceeding the working strain of 5 tons per square inch. A dead load of 28 tons of bricks piled at the centre, within a radius of 15 feet, caused only a temporary deflection of five-eighths of an inch. This Reading-room presents an additional interest from the fact that the Committee decided to illuminate it by means of the electric light; and this has been in regular use ever since its opening in October last. A group of three lights (the current being given off by as many "Gramme" machines) is placed at an elevation of about 15 feet from the floor. A large opaque glass saucer, or chalice, shields the readers below, while with suitable lamps the luminous rays can be reflected downwards from the flattened dome itself.

G. E. STREET, R.A., *Past Vice-President*.—To tell the honest truth the subject of this evening has not great attractions for me. When I see these designs of what may be done, and ought to be done, I confess I am rather alarmed at the future of a country which is supposed to enjoy buildings erected upon these principles—supposing them to be erected. One or two words to our friends the engineers who have been so kind as to come to speak to us. Strange as it may seem, the only design among those on the walls to which I do not object on principle is that of the lattice girder, which it is assumed, as a matter of course, that architects would want to cover up directly; but that is not our feeling. What we like to see is the real construction, and so if I had to make a column of iron, and knew that the strongest form was spoilt by giving it an imitation of the cap and base suitable to a stone column, I should give up the imitation of the stone and frankly accept the strongest form. I wish the engineer would understand that that is our view of what iron architecture ought to be, and that it depends solely and entirely for its value and interest on the working out of its own intrinsic properties, for the purpose of carrying out structures which cannot be put up in any other way. That leads me

to what appears to be the greatest of the snares and danger of this iron-work, beyond which this discussion has not led us one inch, and which affects us architects much more than it does engineers—that is, the use of concealed girders in the middle of our walls. Almost every building is now erected in every part of Europe with the aid of these enemies to all true construction. Their use involves great risk in the future, and I was not very sorry to hear the admission from one of our visitors that almost all of them are certainly rusting rapidly. Such a statement, seldom as it is made or acted on, tallies very much with my experience. If the building is to be constructed of brick or stone its construction ought to be evident throughout. I am offended, and I suppose we all are, by seeing buildings which could not stand upon the terms upon which they appear to stand. I will take one of the most magnificent and costly buildings of recent years—the Prince Consort Memorial in Hyde Park. We architects know how it stands and why, but it is only because we have been told of the box girders which carry the superstructure. To the professional eye it does not appear to have any power to stand; it is an impossible construction as far as the visible supports are to be trusted. In the same way, if you go down our streets, every house appears to stand upon a sheet of plate glass, simply because the engineer or iron manufacturer has given us an apparatus by which we can carry the whole of the front of a heavy building upon an invisible support. That leads to a very false kind of architecture. I think that, by our modern system, the science of planning, which is one of the most charming arts that the architect can indulge in, is running much risk of being lost. Architects are not showing the skill in planning that they possessed when they had no such convenient apparatus for carrying walls over voids as they have now. I believe it is a very unfortunate thing for architects that they are led to avoid difficulties in this easy way. I venture to say, even before so many engineers, that I use less, perhaps, of these iron arrangements than probably the majority of my brethren, and I find I can erect buildings, which I hope are going to stand, without their aid; for I must confess that wherever I introduce them I find myself almost irresistibly led to do things which I ought not to do with them. In such a discussion, before a body like ours, I think we all owe our thanks to Mr. White for lifting us a little out of the question of whether anything so unlikely as complete iron buildings will be ever converted into real architecture. I agree with almost every word he said, and particularly with the way in which he pointed out the false position of Mr. Picton at the commencement of his Paper, by assuming, as I understood him to do, that iron was to be used as the great material of the age, and not only because it happened to be convenient under certain circumstances and as such that it was obligatory upon all architects, but that the great architects of olden times would have all used it to the neglect of other materials which are really more permanent and more susceptible of architectural effect. I wholly disagree with him in that. I do not think the architect of the Parthenon would have liked iron better than marble, or that our own architects from the 13th to the 15th centuries would have done anything of the sort. We have a quantity of examples of those who did use iron very beautifully. I am bound to say to the engineers candidly that in proportion as their art has become more scientific it has become less beautiful. When I look back to the old erections of thirty or fifty years ago I see things, more beautiful and more artistic, executed by engineers without that ugliness which seems now to be almost of the essence of their work, and accepted almost as a necessity. As to the old workmen, you may find almost anything done, which they

thought it desirable to do in iron, ornamentally: because it was done in a natural fashion. You may go to our museums and find such beauty of moulding, hammering, and skilful blacksmiths' work of all kinds, that I believe anybody who takes the trouble to study them will see how full of information they are for him; and I venture to counsel the gentleman who talked just now about the draughtsman who was to be rich in works of various shapes of columns, rather to try to get one who has studied old work enough to be able to invent a suitable design for the purpose. That is the lesson we may get from the old architectural treatment of iron; it was always fitted for its purpose and always more or less beautiful. We all know the beautiful iron hammered screens, many of which have stood in the open air for centuries, in Italy, France, Spain and Germany, exquisitely beautiful in character, design and workmanship. Such work seems to be inapplicable to the accepted construction of iron in the present day, and is, indeed, not what our instructors are thinking of at all. The nearest approach to good modern construction of an iron building that I have ever seen is one that will make you all laugh: I mean some of the public street retiring places; and I am not certain whether Sir Digby Wyatt did not design them. Those to which I refer are plates of iron, enclosed within light mouldings and with patterns raised upon them, which may obviously in themselves be very ornamental; and I conceive that, if we are to build houses of iron, the way would be to do the framework of iron, to leave it exposed to view, and to fill up your spaces with plates moulded in some such fashion as those just described. This would be legitimate iron building. On the contrary, I notice that, exhibited on the wall, are several photographs of iron houses erected in New York, but which are merely bad imitations of stone. And, after all, iron is not; I perceive, the most convenient material there, for directly they get round the corner they use honest brick for the side walls; and I suppose that in New York, where these houses were built, they have other materials which could be and may be used, but they use iron because they can make all those sham mouldings and that sham stonework at a cheap rate. I think our ironmongers must be at the bottom of it; and that is the danger which we have to avoid. Then I have never had explained how an iron building is to be made tolerable to live in. With such a climate as ours you must almost have one house within another if you are going to have any pleasure in an iron erection. We know the difference between living in a house with thick and with thin walls; the former is ten times more comfortable. I am afraid it will take a great deal more than the expression of a hope on the part of the iron-founder to make me believe in the comfort of an iron house, as a thing that one would wish to have for its own sake. I can understand a great bridge, a shed or a railway terminus, being constructed with an iron roof and columns as being the cheapest and most natural mode of doing it, but these are different from buildings for permanent occupation. If I am told to build a house of iron because it is fashionable I might endeavour to do it, but if left to my own discretion to do the best I possibly could for my client I should not do so. The business of the architect is to build as far as possible something which will last. I remember being told by an officer in the employ of the Government that it was the duty of the architect to build not at all for posterity but solely for the present age. I am afraid that that is the iron theory: as long as you can build, pull down and rebuild in fifty years, you may then always have the latest so-called improvements! But that is not the view upon which any architecture can be worth anything. As regards the iron construction which we are to see, I must say that the less attempt there is after decoration,

the more natural and simple the construction, the more completely the construction is shown and not disguised by pretended deference to the rules of stone architecture, the better it will be. Take the roof of the St. Pancras Station which has been so much praised this evening: I do not know whether it was a necessity of that construction that it should be a pointed arch, but I never go into that building without being offended by it. It looks like an attempt to do something which was not natural to the construction; it would have been infinitely more beautiful if a continuously curved line had been adopted, and I should think it would have been at least as strong. *There* is the case of a roof which seems to have been spoiled by an attempt to make it in a certain way architectural in its character. Our great object is to show the construction of our building in every possible way; hence, almost all the iron floors, joists and beams which are concealed in our walls are more or less hateful to us. Where they can be used with advantage, as for instance in a floor, and when we are quite certain that they will not decay, it may be not only convenient but wise to use them, but we do not require treatises on the future of architecture to make us see that or act upon our knowledge. I hope that Mr. Picton will not feel at all affronted at the way with which I have dealt with his Paper; I fear we are being led on a rather wild chase after an imaginary future if he leads us away from the study of the art of our fathers to what I believe to be an impossible development, and in any such enterprise he must expect criticism.

Professor A. B. W. KENNEDY, M.Inst.C.E.—Before saying anything as to the Discussion which has taken place, I would like to put before the Institute some particulars which may, perhaps, be of interest to its members. I obtained a piece of steel joist, such as described in my Paper, and also a piece of an ordinary iron joist; I cut both up in the same way, and tested the pieces cut from them. The results of these experiments are given in the accompanying Table:—

COMPARATIVE TENACITY OF SPECIMENS CUT FROM IRON AND STEEL ROLLED JOISTS, 12" by 6".

	No.	Position in Joist.	Breaking Load in tons per square inch.	Extension in 3 inches.	Fracture.
Iron Joist	330	Web along fibre ...	18.3	—	Half crystalline.
	331	Flange „ ...	19.6	0.05"	Entirely very largely crystalline.
	332	„ „ ...	18.84	0.05"	Very largely crystalline.
	333	Web across fibre ...	15.15	0.02"	About $\frac{1}{3}$ crystalline— torn and laminated.
	334	„ „ ...	13.97	Not perceptible.	Do. Do.
Steel Joist	335	„ „ ...	8.19	„ „	Very bad weld.
	337	Flange along fibre ...	47.73	0.43"	Granular.
	338	Web across fibre ...	48.13	0.68"	About $\frac{3}{4}$ granular and the rest silky.
	339	Web along fibre ...	46.90	0.69"	About $\frac{1}{2}$ granular and $\frac{1}{2}$ silky.

Mean Tenacity of Iron Joist	Along	Fibre	18.91	Tons per square inch.
" " " "	Across	"	12.43	" "
" " " "	"	" (omitting No. 335)	14.56	" "
Mean Tenacity of Steel Joist	Along & across		47.59	" "

These figures need no comment as to the relative strength and ductility of the two materials. The steel has about three times the average strength of the iron, about twelve times its ductility, while its tenacity is the same along and across the fibre. Beyond this, however, the results also serve to emphasize particularly one thing, upon which I laid stress in my Paper, that if architects have to use considerable quantities of iron work, and wish to have it tested, which I certainly think desirable, they should take precautions to make the tests in such a way as will tell them really what the material is. The iron joist, which comes out so badly in the results placed before you, passed the ordinary deflection test quite well, and was duly accepted by the inspector. But I scarcely think anyone would have passed a piece of material so utterly bad had they known the results of the tenacity tests here given. I should add that the steel joist tested was part of one rolled at the mills of Messrs. Bolckow, Vaughan and Co., of Middlesborough, and was sent to me by the kindness of Mr. E. Windsor Richards, their manager. In this very interesting Discussion I have particularly enjoyed many of the remarks of Mr. Street, but must confess to have been a little surprized at one or two of them. It is really not we unfortunate engineers who conceal our ironwork or who put those abominable mouldings at the bottoms of our columns, or who build apparently impossible brick walls over vacuous spaces! On the whole we are really tolerably innocent of these particular faults, in Mr. Street's condemnation of which I heartily concur. We do our best as a profession, when we have to build a structure, to make the most economical use of our materials, and to make it as little unsightly as we can. Of course with a large iron bridge or roof, it can hardly be expected that we can have the beauty which properly pertains to architecture. We cannot even attempt to put our structures in comparison, in that respect, with those of architects. Any beauty they have must be the beauty of fitness and scientific design. But the attempt to imitate in iron the mouldings of stone, and to cover up iron with brickwork, to support something which is to stand apparently on nothing whatever, are not things of which we are as a profession guilty, and I only hope Mr. Street may be able to persuade all other architects to think entirely with him in the matter. I may mention in this connection a detail in an iron structure which has struck me as adding very greatly to the appearance of an iron roof. I first noticed it in the Machinery Hall of the last Paris Exhibition. There the appearance of the braced principals of an ordinary sloping roof was wonderfully improved by making the (braced) purlins vertical instead of right angles to the surface of the roof. Looking down the building you saw a more or less graceful perspective of lines, instead of an eye-confusing wilderness of braces at all sorts of different angles, as one does with the ordinary construction. I have heard lately that one of our principal Sheffield firms, Messrs. Brown, Bailey and Dixon, is making, for special purposes, a material which is practically nothing but a very pure iron,—as pure as "mild steel" and much softer. From what I hear I am greatly in hope that this material may turn out to be the thing we so much desire for hammered work. That "mild steel" is capable of being hammered we see from the beautiful vase which Dr. Siemens has

placed on the table, but it is somewhat hard and difficult to work. If this softer and purer material can be also used for ornamental work of that kind, I think there will be at our disposal a material of very much the same kind as the finest iron that the old hammerers had before them,—a material which we have not had for a long time. Whether it will stand this abominable atmosphere of ours, for which neither architects nor engineers are responsible, and which is destructive alike to the works of both, I do not know.

G. E. STREET, R.A., *Past Vice-President*.—Allow me to say that I was not attacking engineers in my speech; I was attacking architects.

J. A. PICTON, F.S.A.—Let me first thank the Members of the Institute for the kindly manner in which my Paper has been received. I am quite as conscious as any gentleman here can be that it has many defects, and perhaps I may be allowed to say that I was a pressed man in the service, although I very willingly complied with the request made to me; and therefore any defects that may have occurred in it I trust to your consideration and kindness to pardon. I have been rather misunderstood by one or two of the speakers. It seems to be thought that I was advocating that iron should supersede the materials now in use, and take the place of timber, stone and brick in the construction of ordinary dwellings and buildings. I had no such idea in my mind at all. Personally I would very much rather go upon the old lines, and stick to the principles by which true architecture in all ages has been designed. But we cannot shut our eyes to the progress around us; the increased use of iron in all departments of human convenience is a fact. You cannot get over it; it is increasing every day and will increase still more, and there are many purposes connected with construction in which the use of iron is indispensable. I will take one or two cases. No doubt a gentleman so eminent in Gothic architecture as Mr. Street very naturally prefers that class of work in which he is upon the old principles of construction and material, but I want to know what Mr. Street would do with a circular building, 100 feet in diameter, if asked to construct a flooring without any intermediate supports? If it is to be done at all conveniently and strongly it must not be with his ordinary materials, but with iron. So in regard to the St. Pancras roof: What could you do in timber? In iron you have a material which combines lightness, strength and beauty, for I maintain that a structure in iron can be made quite as beautiful as a structure in timber, and that you can carry out what is wanted with an ease and propriety to be attained with no other material. Now this being the fact, and the use of iron increasing every year, I ask you as architects: Are you disposed to shirk the application of your talent and ability without working that up into the requirements of the present day? Will you leave it to the builder, the iron founder or the engineer? or will you not rather, applying the principles of taste which have distinguished you in every department, endeavour to work up this material in the best manner both for your credit and for the sake of art? It seems to me that the wants of the age call for an effort in that direction, and that is really all that I maintained in my Paper. Then I should further say that all true architecture must depend and has always depended for its effect upon the nature of the materials. All the æsthetics of architecture must be drawn from the nature of the material in which you work, and when you get out of this line you get into false construction and bad taste. Now iron having come very much into use, it is the business of the architect to appropriate it for use and beauty. I say you cannot help the use of iron being brought out. It has been used, and I see before me

a number of "frightful examples" upon the wall to show what a wretched thing iron is when unæsthetically applied. That rather proves my case. In driving through the streets of London I have seen a few specimens of iron fronts, and anything more hideous I never saw in my life. What does that prove? Two things: first, that iron is forcing itself into use in spite of all that can be said against it, because of its convenience; and secondly, that architects have not been employed at all in these works, or that they have not turned their attention to making the best of the materials supplied. That seems to be a sufficient proof that steady æsthetical construction in iron is a thing very much requiring to be studied by architects. I can point to one or two buildings lately where the façades in street architecture have been constructed in iron, and as I had nothing to do with them, I may say that in Manchester and Liverpool there are one or two buildings of the kind which are very well worth notice. They are a successful attempt to adapt iron in a manner combining something of beauty with strength. I believe there is a wide field open for architects when they turn their attention in that direction. Mr. White said something about the adoption of iron in designs, and I could not quite agree with his view of the mode of adopting it. He talked about using hollow columns and mouldings derived from other sources. That is simply reducing it to a sham. That is what I want to avoid, and to let iron take its proper place, and not imitate other materials, but be distinguished by the properties which belong to it: lightness combined with strength and elasticity. We know what became of architecture by the system of "compo;" where iron is employed let it be honestly shown. Let its own properties be brought to bear upon the nature of the design that is put forward, and in that way, and in that way only, we shall follow in the lines of our predecessors, and obtain from the material employed the greatest amount of beauty of which it is capable.

THE PRESIDENT.—I think Mr. Picton's few remarks in replying to different points raised in this Discussion are extremely pertinent and form a conclusive answer to many of the observations that have been made. The matter before us has been one of extreme interest. Both in the Papers and in the Discussion there has been a great deal of implied suggestion as to the necessity of studying how to use iron in architecture. There can be no doubt that if architects would establish and apply to the use of iron those constructive principles which they have been taught and feel while using wood or stone to be mathematically and æsthetically true, they would render a great service to this "iron age." They would confer in so doing far more lasting benefits than can ever be obtained by abusing a material that they are compelled to employ, or taunting the engineer with the artistic ugliness of his works. Our Transatlantic brethren have built entire façades of iron, but on glancing at certain photographs, which have been hung on the walls at my instigation, you will perceive that those façades are only imitations of wrought and sculptured stone, cast in iron. Another remark I would make is that, supposing iron is to be largely used in the construction of buildings in London and other cities, I think it will be necessary to approach the authorities with reference to the building laws now in operation, seeing that iron as a material is almost unknown and unconsidered in the various metropolitan and local building regulations extant. For whatever be the ultimate fate of iron, however æsthetically wrong may be its present application, it is palpable to me that the use of it structurally must increase, and that it will hereafter be used to a much larger extent than has yet been the case in architectural construction.

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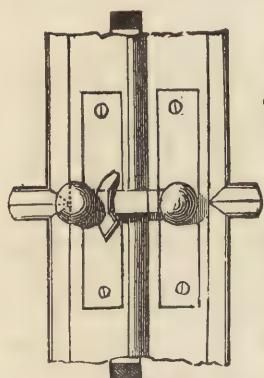
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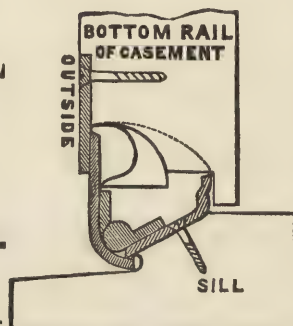
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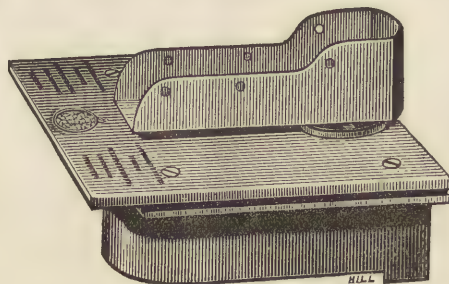
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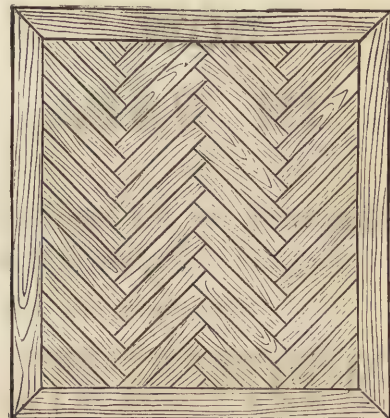
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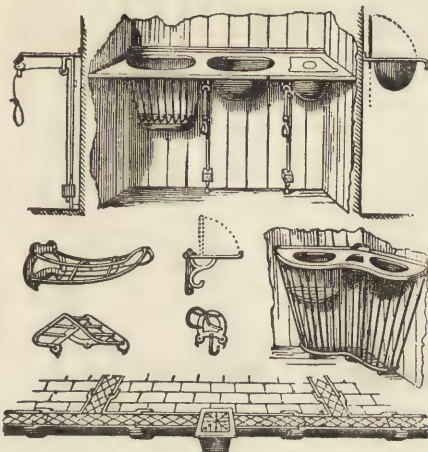
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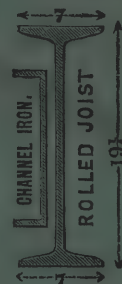
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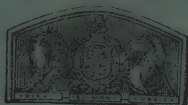
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II. Frederick Pepys Cockerell: a Memorial Sketch	Anonymous	Dec. 15th.
III. Buddhist Architecture in the Jellalabad Valley	William Simpson, F.R.G.S., <i>Hon. Assoc.</i>	Jan. 12th, 1880
IV. Architectural Competitions	Thomas Porter, <i>Fellow</i>	Jan. 26th.
„ Adjournd Discussion on ditto	Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> , Professor Kerr, <i>Fellow</i> , and others.	Feb. 9th.
V. Portland Cement	Henry Faija, Assoc.M.Inst.C.E.	Feb. 23rd.
VI. The Polychromatic Decoration of various Buildings	John Pollard Seddon, <i>Fellow</i>	April 5th.
VII. Iron as a Material for Architectural Construction	James Allanson Picton, F.S.A.	April 19th.
VIII. "Mild Steel" and its applications to Building	Prof. Alex. B. W. Kennedy, M.Inst.C.E.	
„ Discussion on Iron and "Mild Steel"	Dr. C.W. Siemens, F.R.S., <i>Hon. Assoc.</i>	April 19th.
„ Adjournd Discussion	William White, F.S.A., <i>Fellow</i> , Geo. E. Street, R.A., <i>Past Vice-President</i> , and others	May 24th.
IX. Presentation of the Royal Gold Medal	John Whichcord, F.S.A., <i>President</i> .	June 7th.
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PATENT SASH OPENER AND AUTOMATIC FASTENER

WITHOUT SPRINGS,

Affords Ventilation with security when the Window is opened at the top or bottom.

Its efficiency is proved by the fact that it securely fastens the sashes both when closed and when partly opened for the purposes of ventilation by automatic action, and acting by gravitation without springs, its construction is of the simplest character.

It is especially useful for those sashes where the centre bar is so high as to place the ordinary Fastener out of reach.

It is fixed when used by itself at the junction of the sashes on one side and is released by means of a single line; closing the sash automatically brings the Fastener into action. If the SASH OPENER be combined with the Fastener (see illustration), as is very convenient in heavy sashes, one pair of lines for opening and another for closing are used.



HOOKEHAM & LUDLOW'S PATENT BRASS-HEADED WOOD SCREWS

Are iron screws with the heads firmly covered with brass. They are made with either plain or tinned-iron shanks, and have the appearance of brass with the strength and durability of iron. They are from fifteen to fifty per cent. cheaper than brass, according to size; and, having the heads always the full diameter, which is not the case with brass screws, their greater strength can be taken advantage of, to use smaller sizes, thus making the price still more favourable.

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Perfect Security, with Extreme Facility in Hanging.

THE LINE is made with a core of STEEL PIANO WIRE of the quality used in the best pianos, and adapted to support a great strain for almost any length of time; exactly what is required for pictures.

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Registered NIPPERS, made entirely of cast steel, and useful for numerous household purposes, especially for opening champagne, may be had with the Line.



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Suitable for all kinds of—especially Venetian—blinds which are worked by lines. Is simple in construction and perfect in action. The blind is raised or lowered by holding the line or lines out of the vertical line, when, in consequence of the moveable roller immediately falling to the bottom of the slot, the lines become free to move up or down until released, when, falling vertically, the friction causes the moveable roller to be drawn up towards the fixed roller, and automatically clamp them.



Patent Book-Shelf Fittings

Are intended to replace the troublesome studs by which book or other shelves have been usually regulated. The perforated metal strips are let in and screwed to the upright frames. The plates, although sufficiently strong to support the heaviest books, are so thin as not to require to be mortised into the shelves, and by the facility with which the plates are inserted, a fine adjustment can be given to the shelves without an irritating waste of time.



HOPKINSON'S PATENT GUARDED LEVER SASH FASTENER

Is the ordinary fastener, with a projection on the left of the arm, forming the PATENT GUARD, which, when the window is fastened, lies up to, and immediately behind the opening between the sashes. When any instrument is thrust through the opening to force back the arm, the PATENT GUARD, instantaneously closing on and tightly wedging it, effectually prevents the instrument from forcing open the fastener.

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IX. PRESENTATION OF THE ROYAL GOLD MEDAL, 1880,

To JOHN LOUGHBOROUGH PEARSON, A.R.A., *Member of Council.*

The PRESIDENT.—Gentlemen, the time has come round when it is again my duty, as your President, to present the Royal Medal annually conferred by Her Gracious Majesty “on such distinguished architect or man of science as may have executed a building of high merit or produced a work tending to promote or facilitate the knowledge of Architecture or the various branches of science connected therewith.” Last year, you will remember, the Medal was given to the Marquis de Vogüé, a Frenchman well known in this country for his archæological researches and his literary and artistic contributions to our knowledge of ancient architecture in Syria and the Holy Land. This year it is the Englishman’s turn. The recommendation of the Council was that the name of John Loughborough Pearson be submitted to the Queen as worthy to receive the Royal Medal, and the Institute having, in the free exercise of its discretion, confirmed that recommendation, it was duly submitted, and the Queen’s private Secretary was commanded to notify Her Majesty’s approval of the award. Perhaps, to many of you it will be mere supererogation for me to state why and wherefore Mr. Pearson is entitled to this compliment, the highest that the Institute can bestow upon anyone, either within or without its ranks. That a few will be glad to hear something about him has been proved to me by a slight but amusing incident which occurred only the other day. I chanced to overhear, quite involuntarily, a conversation between two architects on this very subject. One complained that the Royal Gold Medal was this year to be given to a Mr. Pearson, of whom nobody had ever heard and whom nobody knew; while the other, who had written to a newspaper for information of this Mr. Pearson, declared that the Council chose him because he was one of themselves. Not being an impulsive man, I did not thrust myself upon those two gentlemen. But had I asked them whether, some thirty years ago when the architecture of the middle ages was not understood as it is now, they remembered the erection of the Church of the Holy Trinity at the foot of Vauxhall Bridge, or the Church of St. Peter, built some seventeen years ago at Vauxhall, I am quite sure that they would have declared themselves familiar with both. They would have known, notwithstanding the hugeness of London, the Church of St. Augustine at Kilburn and the new Church of St. John in Red Lion Square. But the fact is, they had not cared to inquire who the architect of those works was, and he had never, even in these pushing, enterprising days, ostentatiously identified himself with those buildings; or loosened, even for a moment, the old-fashioned bond of modesty and merit. I happen, however, to know that when this church I have mentioned—the Holy Trinity, Westminster—was rising, the future success of its architect was predicted by no less an authority than Augustus Welby Pugin. He was a frequent visitor during the progress of the works, which he considered to be in advance of anything then accomplished under the Gothic revival. Indeed, commencing, as Mr. Pearson did, his professional career in sight of the towers and almost within the walls of Durham Cathedral, his natural abilities were early consecrated to the study and practice of mediæval architecture. An Associate of the Royal Academy, his promotion to the higher grade is necessarily at hand. Architect to the Abbey of

Westminster, the Cathedrals of Peterborough and Lincoln, he has just seen laid the foundation stone of Truro Cathedral, about to be erected from his designs and under his direction ; and thus, silently and perseveringly, a proud and an enviable position has been surely attained. Sir, I must remind you that, in the act I am about to perform, I am merely the instrument of the corporate body of British Architects, and that this gracious gift of the Queen is awarded to you with the hearty and sympathetic approval of your colleagues. I present you, Mr. Pearson, with the Royal Gold Medal, as a tribute not only of just admiration for the noble works of architecture which you have designed, but also of sincere respect for your professional and private virtues.

J. L. PEARSON, A.R.A., *Member of Council*.—Mr. President and Gentlemen, I never felt more embarrassed in my life or more unable to express my thoughts and feelings than at the present moment. I know not how to thank you sufficiently for having paid this great compliment to me, in having advised Her Majesty to confer this honour upon me. I hope you will be content to accept my simple thanks, and to believe that in so doing they are accompanied with very deep and very warm feelings. To Her Majesty I owe my thanks for having graciously adopted your recommendation, and in bestowing upon me this honourable token and distinguished mark of her approval. To you, Sir, I desire to offer my sincere thanks for the very kind and complimentary way in which you have introduced me this evening ; you have been pleased to say much about me that is highly flattering, but I cannot help feeling that it is far more than I deserve. And to you, brother architects, I owe my heart-felt thanks for the cordial way in which you have received me. This evening's proceedings will ever be implanted in my recollection—I shall never forget them. To have gained your very favourable opinion of my works is indeed something to have struggled with the world for from early youth, something to have toiled for through many a long year, and something I repeat that will ever be deeply impressed on my memory.

Right Hon. A. J. B. BERESFORD HOPE, M.P., *Past President*.—Mr. President and brethren all, I feel myself indeed happy and honoured in being able this evening to join in this most triumphant and most inspiring ceremony—to join with my brethren of the Institute in giving our congratulations to Mr. Pearson and expressing our sense of the wisdom—the instinct which the Council have shown in their recommendation to Her Majesty this year. I know a little myself of the troubles and difficulties which beset the Council in choosing the recipient of the Medal. During the two years I had the honour to sit in the Presidential Chair I can assure you, while it was one of the most pleasurable duties that your President had to fulfil, it was at the same time one of the most difficult and the most delicate. This year, Sir, you have made a choice which is possibly only too perfect, for like that old Asiatic king you have to tremble when all men say you are supremely happy and no one has anything to say against you. Still what ill can befall you for having honoured Mr. Pearson it is beyond my poor wits to divine. Personally I must say as one who has for many years fought shoulder to shoulder with—rather I should say behind and in due subordination to him in the fight for the grand old architecture of the middle ages—I say this is a grand and a supreme decision. Our friend Mr. Pearson is indeed a true, a bold and a loyal knight. Early in life he paid his vows at the altar of that chaste, sternly beautiful imperial virgin *Ars Gothica*, and to her he has been faithful all his days. Sometimes no doubt like other people he has had temptations, but he at

least has never yielded to the smirks, the leers and the romps of naughty Queen Anne. Poor woman! we all know she is dead, but yet she is dead-alive. Any of you who have read the good old German stories, which used "to make our blood run cold" when children, may remember "Wake not the Dead," the plot of which is that a nobleman who had lost his wife went to the sorcerer to bring her to life again, and she revived but turned out a vampire. True Queen Anne is dead, but there is that Queen Anne whom sorcerers have recalled. So when we see her frisking about us we ask, "Who are you, and what are you?" She answers, "Now, my dear fellow, how very hard you are upon me! You know I am free-classical." More free than welcome or classical either, I think, but then I respectfully reply, "Honoured madam, royal madam, your freedom nobody can deny, but how are you classical?" Whereupon she responds, "Why, don't you see classical means anything or nothing; and if I say it means myself, who are you that you do not agree? There are the Parthenon and also Phidias, there are Pater and Mr. Symonds to enlighten your ignorance, and I can't help you if you do not see that I am this world and the other world too. I am classical, I am gothic and I am renaissance, because I am Queen Anne who never was any of the three. In the name of the magnificent lines of the Parthenon, its severe beauty, its solemn sternness, its Doric columns and massive entablature, I give you the fantastic broken gables of Amsterdam." Those broken gables are very picturesque, but in the name of all things above the earth and under the earth, how are you to defend the gables of Amsterdam by the arguments on which you rely to demonstrate the superiority of the pediments of Athens? You can only show upon the assertion that they are free-classical. What you mean is to claim that in your new style you combine the stern severity of the ancients and all the gay caprice, the beautiful varieties of the sky line and the light and shade of the gothic or of the middle ages all under the patronage of Anne Stuart, the most decorous, most respectable, but least imaginative of English Queens—

"Who sometimes counsel took and sometimes tea."

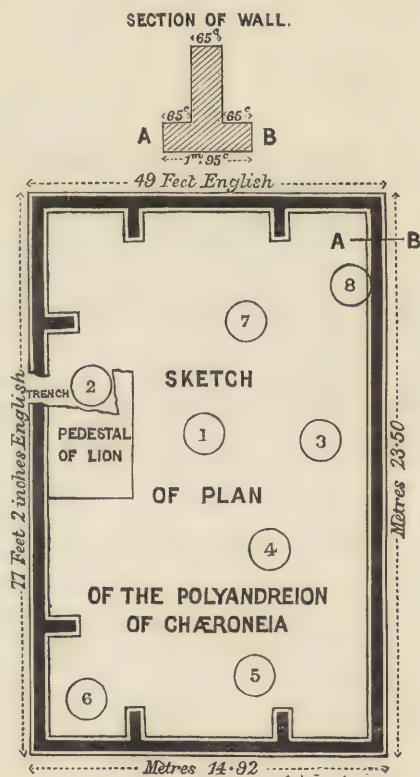
Now, Mr. Pearson, you have had the courage to resist that fashion, and we honour you for your persistence. You have not built a new street through Chelsea, Brompton or anywhere else. You have created Truro Cathedral. It will be built, and when it is built, whether Providence preserves your life to crown the spire as Providence preserved the life of Wren to put the last stone on St. Paul's Cathedral, yet Truro Cathedral in your hands or in those of your representatives will be your work and your work only; and when we recollect a few years ago how we struggled to embody anything like form or grace or majesty in the parish churches,—which alone we then could raise,—the idea that the heir to the Crown, side by side with the Bishop of a new See, should really lay the corner stone not of a thing that was called a "Cathedral," but of a Cathedral, ranging in form, material, size, grandeur and visible appropriateness of structure to object with the old Minsters of the land, would have been scouted as an impudent dream, even at the comparatively recent day when I first took my seat as an Honorary Fellow in your Meeting-room. Mr. Pearson began with the noble spire by Vauxhall Bridge, a spire which, whatever people may say of it or however they may compare the building with his later works, will leave its mark upon the London landscape as a monument which stands out with singular dignity and gracefulness and that ostensible pretention of magnitude which comes of a noble proportion. If I were to blame him for anything, it

would be that in his subsequent work, noble and stately as it is, he has not given us a second and a better edition of the style which he early embodied in that church. I daresay people will think it is a caprice, but I have never ceased from believing that there is one phase of our indigenous Gothic which has been in our days too much neglected; we have too much forgotten to develope that most beautiful but transient style when the second period was just merging into the third—the ogee period, the flowing Middle-Pointed of England. I trust the next cathedral he builds will be one which carries out that style, and I think that his present task imposes this particularly on him, because the mother of his daughter, Exeter Cathedral, is our chief specimen of that phase—a building not enough known or appreciated, but yet a wonderfully delicate, thoughtful, lovely specimen of form which only just put in an appearance and then disappeared. Forgive me for this digression. I have not often the chance of lecturing on Mr. Pearson, still less have I the chance of lecturing on Mr. Pearson with Mr. Pearson present, and so when the two happy opportunities come together the temptation is really rather a strong one. Since that time he exhibited his bias towards early French, but he has had the admirable sense not to run into extremes in dealing with that noble and magnificent style. It is a massive style, but this massiveness may be exaggerated into mass. He never forgot that he was an Englishman, and in his church at Kilburn, carrying out as he did the early style, he gave us a plan purely and absolutely original and individual, every feature of which he could justify, but in no feature of which, those who owed him no good-will could accuse him of cribbing and copying. He has shown how the study of early French enabled him to take up the early style of English, give it an increment of nerve and force, and so present it to the world as the English architecture of the 19th century. I say to him, go on and prosper. The next church I claim for him shall be the thread taken up of Holy Trinity, Westminster. Meanwhile, in St. Peter's, Vauxhall, in St. Augustine's, Kilburn, in the church in Red Lion Square, there is a noble trilogy of work subtly conceived, boldly carried out, standing forward as the presentment of an architect who holds up the standard of traditionary art, and yet on that traditionary art stamps his own seal, produces his own idea and vindicates originality for his age. Of Mr. Pearson's great work just commenced at Truro I shall say no more. I am satisfied that future ages will point to that work as a phenomenon of our time, and of that phenomenon of our time the name of its architect will be one famous in the annals of the land.



X. THE CHÆRONEIAN LION.—A Communication from LYSANDROS KAFTANGIOGLOU,
Hon. and Corr. Member (Athens) to Professor DONALDSON, Past President, translated
 by the Professor.

MY DEAR AND VALUED FRIEND AND COLLEAGUE,—I hasten to give you very interesting news in reference to the ancient history of Greece and to Art also. You know well the *Lion of Chæroneia*, consisting of different hollow blocks of stone, held together by iron cramps. The greater part of the description of travellers was hitherto erroneous and inexact. Some said that the Lion had been blown to pieces by powder! It appears, on the contrary, that it had fallen to pieces (having been constructed after the burial of the bodies) through the bad construction of the foundations and the badness of the material of which it (the pedestal) is composed, it being a friable stone. You know that our Archæological Society had decided to set up the Lion on its old pedestal, of which there existed only the underground part. But before undertaking the work, they ordered excavations to be made around the pedestal (which they then believed to be complete in itself) and which had been set up as an honorary monument to the brave heroes, who had died for the liberty of Greece. But this operation brought to light the fact, that the pedestal of the Lion formed an essential part of a parallelogrammatic enclosure, mètre 23·50 long by 14·92 wide! The Society then ordered the excavation of the whole enclosure of the Peribolus, which was scrupulously carried out by the Inspector, clearing away the soil to the lowest course of the pedestal, and even a little lower all around the foundation. This, however, brought nothing to light, except six small buttresses projecting interiorly from three sides of the enclosure. There did not appear any plausible reason for this position of the buttresses (unless they indicated the positions of the bodies of the allies who had fallen and who were of that number. This, however, is mere supposition). The Society, having expended 7000 francs (£280) in this operation, were discouraged by the absence of any discovery to counterbalance the expense, and the funds are very inadequate to meet the works they have in hand. The cost, however, had greatly exceeded their budget. The Society, therefore, decided for the moment, before undertaking the setting-up of the Lion itself, to examine and verify the existing parts,—to study how it had been put together originally and to search in the adjoining village whether



NOTES ON PLAN.—1, 2, 3, 4, 5, 6, 7, 8, holes sunk in the ground. The "trench" was afterwards made to sink down to the foundation of the pedestal, which is much damaged. The footings of the outer wall are very broad being on bad ground.

there could be found any pieces of the decoration of the pedestal.* This proved abortive, and carried the conviction that there was nothing further to hope for, as the Inspector reported that he had examined the soil even to below the lowest course without success. Mr. Phytalles, one of the best sculptors of Athens, was charged to make on the spot further researches, particularly of the artificial soil of the foundation of the pedestal; making new soundings and still deeper in the middle of the enclosure, for we could not be persuaded that the Inspector had been correct in asserting that the pedestal had rested on a foundation which was not solid. In fact on digging eighteen inches below the previous openings bones were discovered and skulls! There were then made other holes at six different points, and skeletons were found placed parallel one to the other and covered with a blackish earth, arising probably from the decomposition of the bodies, and the skeletons solidly adhering to the soil. In one of the holes an iron lance was found, and a strigil used by bathers to clear off the perspiration from the skin. In others were pieces of ivory and bronze buckles. After this unexpected discovery, which proves that the enclosure was nothing else than the polyandreion, or cemetery, in which had been interred the remains of the brave heroes killed at the battle of Chæroneia, Mr. Phytalles returned immediately to make his report and to receive more precise instructions. An Ephora, accompanied by Mr. Phytalles, was immediately dispatched by the Society, with the order to regularly carry on the excavations. We therefore hope to find many interesting objects among the skeletons, and possibly an inscription, indicating the precise epoch of the erection; for as yet no inscription has come to light. But we are assured that the famous Lion of Chæroneia was part of the funereal monument of the dead heroes.

I have unfortunately been unable myself to be present at these operations, having been always suffering somewhat from this terrible winter, which has frozen our orange trees and caused great damage to our olive trees and even our vines. I hope you will be the first to receive intelligence of our Chæroneian discoveries, and I pray you to communicate them to the Institute of British Architects. I will immediately let you know if any further important discoveries occur.

I have to tell you that M. Condostarlos, President of our Archæological Society, has just been appointed our Ambassador at London. He is highly respected here, and a great partisan of the liberal policy of your great Canning.

Ever your devoted Friend,

L. KAFTANGIOGLOU.

ATHENS, 29th April, 1880.

* The attitude of the Lion was apparently that of a sitting position or squatting on the haunches. The head was in a single piece, dished out on the inside to lighten the weight, as are the other pieces forming the body. The expression of the face is by no means noble—the mouth too wide—not so good a face as that of the Parthenon (cornice). Nothing mannered about the head except the eyes, which do not appear at all natural. The balls are sunk out. The muscles and bones are like those at the Parthenon, except that in the latter there is a greater sinking at the temples. The mane is easy and flowing, the ears scarcely visible.—*MS. Notes of Journal of J. L. Wolfe.*

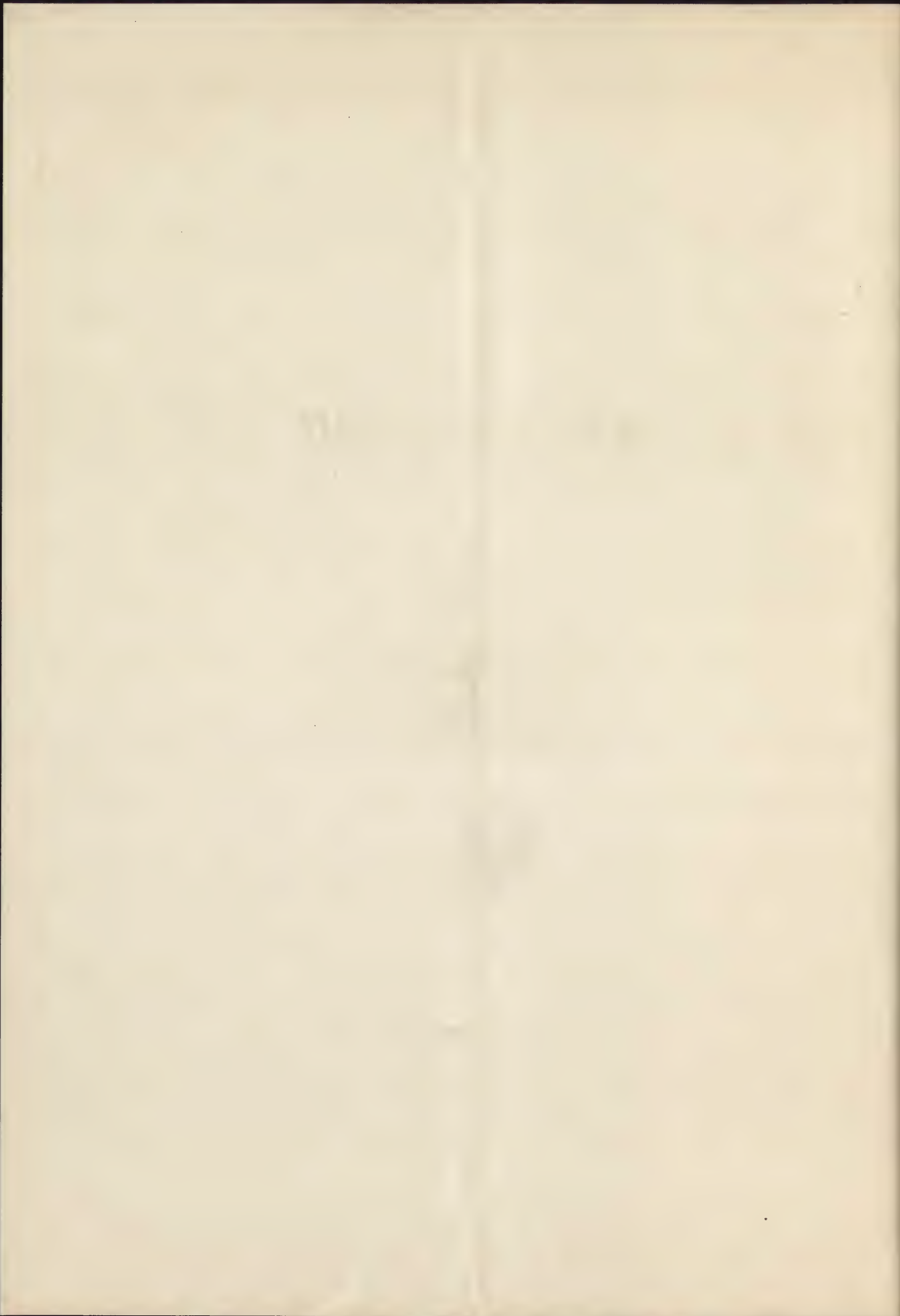
Chæroneia, now called Caprăna, lies in a plain about six miles from Livadhia, the oracular grove of Trophonius. Ten minutes before reaching Caprăna are the remains of the Lion, which no doubt formed the sole ornament and epitaph on the tomb of the valiant Thebans, whose fate was the final blow to the liberty of their state and gave to Philip the Empire of Greece.—*Note from MS. Journal of T. L. Donaldson, 1820.*

G. E. STREET, R.A., *Past Vice-President*.—I have great pleasure in proposing a vote of thanks to our venerable friend and Past President, Professor Donaldson, for the communication he has made on behalf of our Corresponding Member at Athens.

CHARLES BARRY, F.S.A., *Past President*.—This Gold Medal night is always a signal night with us on all occasions, and to-night it has been emphasized by the presentation of the Gold Medal to so worthy a recipient as Mr. Pearson. I could not have added anything to the extremely proper though not too eulogistic discourse of Mr. Beresford Hope upon that, but to me the presence of our veteran Professor Donaldson is an event of equal significance with the other. That he should be able to come amongst us at his great age, with all that vivacity and interest in the work of his long life—that he should be able to set us an example of youth, of energy and of earnestness in the way that he does, make this a most signal occasion in my own mind, and I think it will in the minds of all his old friends. I have, therefore, more than ordinary pleasure in seconding the vote of thanks to Professor Donaldson for his presence here, for his communication, and not least for the grace and geniality with which he has communicated it to us.

Professor DONALDSON.—I feel very much gratified by the kind expressions of my friends on this occasion. The truth is this, that the love of my profession has been the guiding star of my whole life. From its very beginning I have taken an interest in all that relates to architecture and architects, and this is a feeling that will rest with me during the whole of my existence, short now though it must be.





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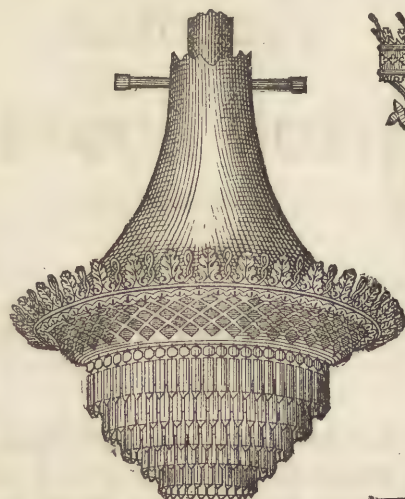
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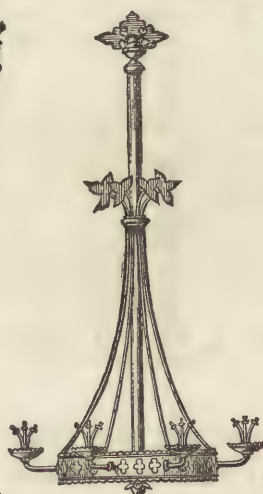
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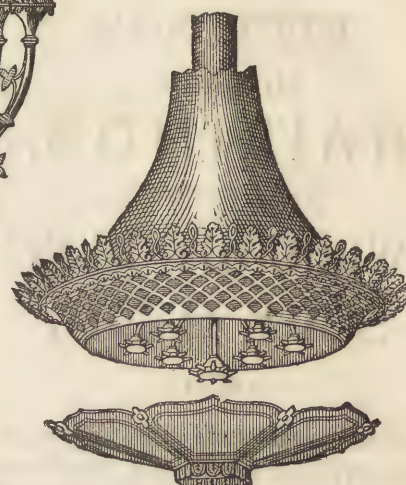
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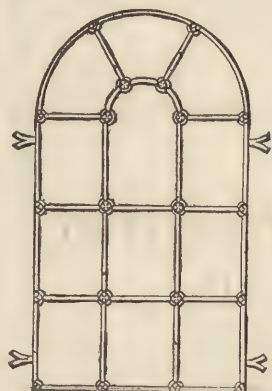
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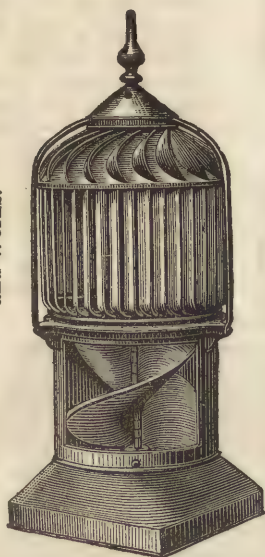
ONLY MEDAL for Revolving Archimedeian Screw Ventilators, Paris Exhibition, 1878.

BY SPECIAL APPOINTMENT TO THE ROYAL COMMISSION, PARIS EXHIBITION. 1878.

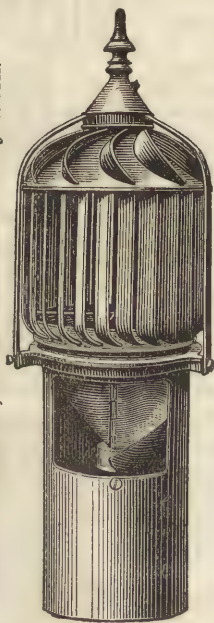
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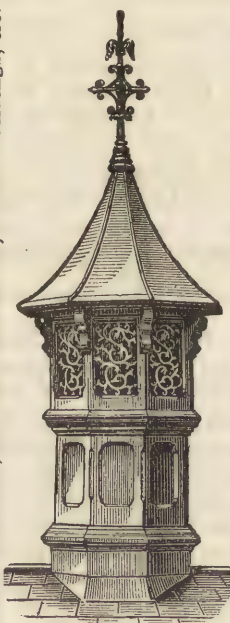
No. 1 Ventilator, for Ventilating all kinds of Buildings and Works.



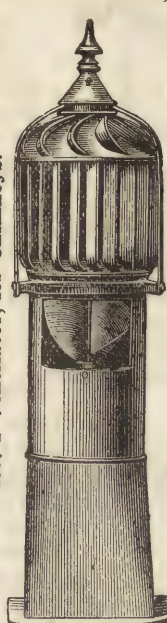
No. 1 Ventilator, Round Base for Sanitary Work.



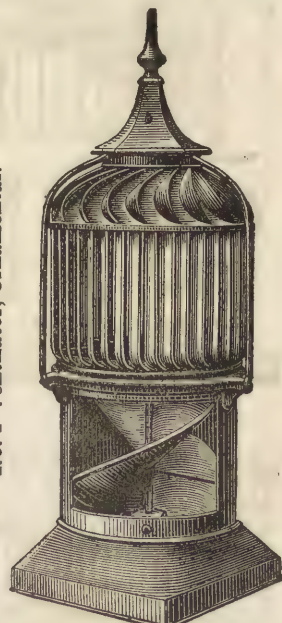
No. 3 Ventilator, for Hall Residences, Public Buildings, &c.



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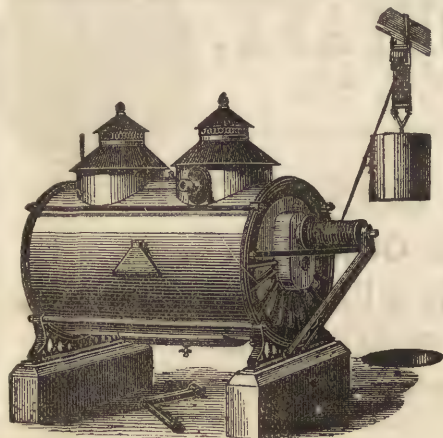
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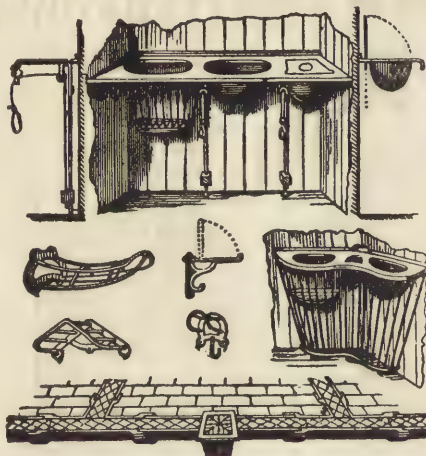
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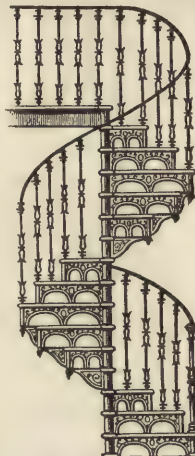
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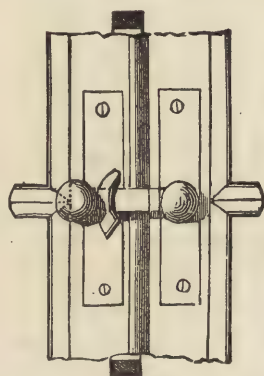
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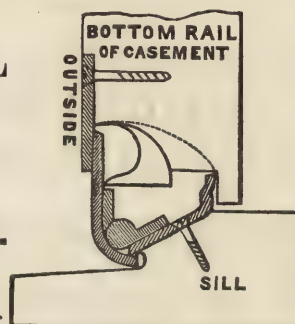
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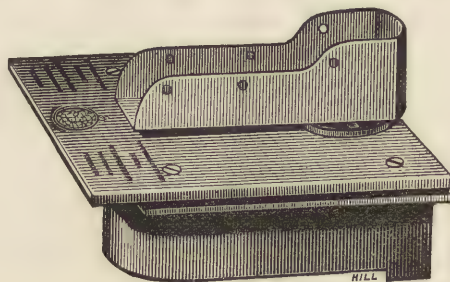
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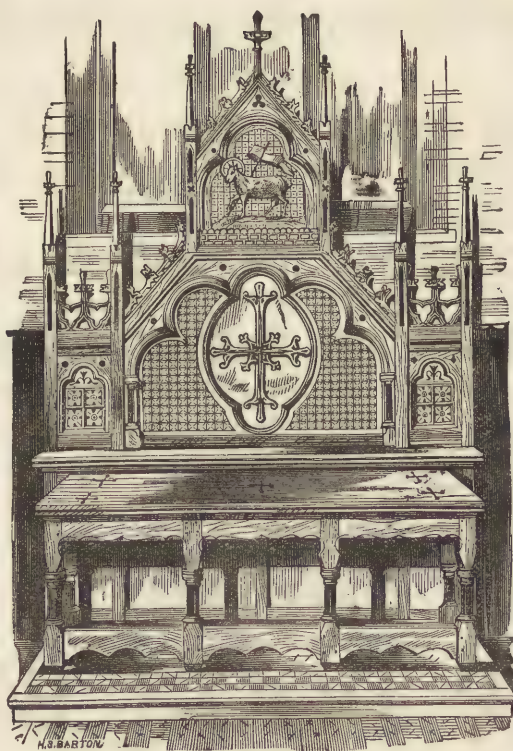
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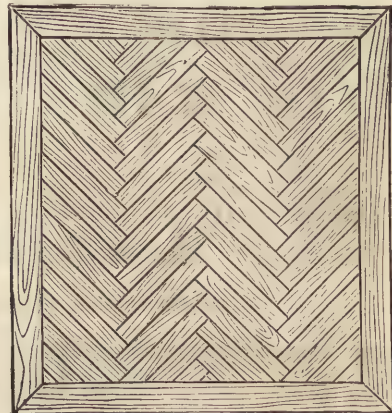
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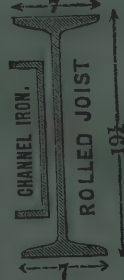


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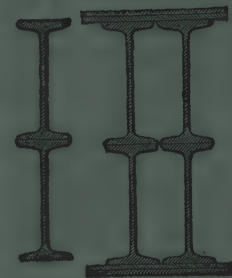
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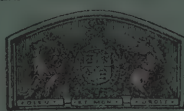
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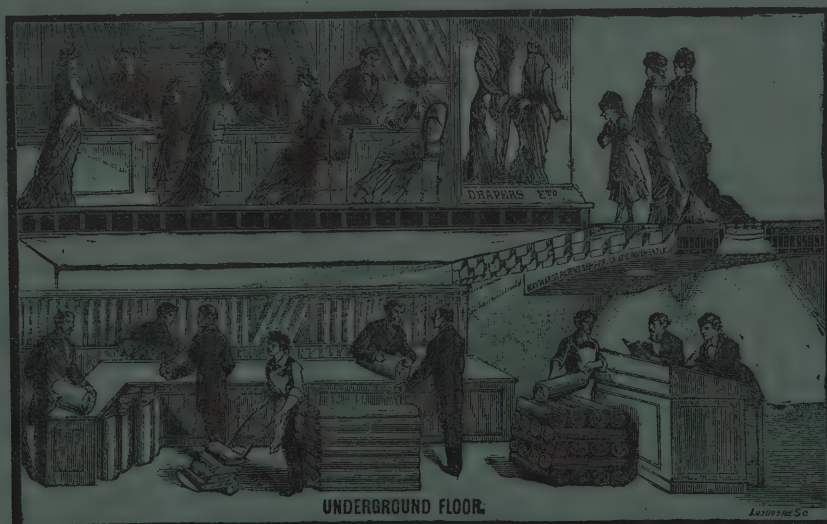
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### No. 12.

| TITLE OF PAPER.                                                                                                                                                                                                                                                            | AUTHOR'S NAME.                                                                                             |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------|
| I. Opening Address                                                                                                                                                                                                                                                         | John Whichcord, F.S.A., <i>President</i>                                                                   | Dec. 1st, 1879  |
| II. Frederick Pepys Cockerell: a Memorial Sketch                                                                                                                                                                                                                           | Anonymous                                                                                                  | Dec. 15th.      |
| III. Buddhist Architecture in the Jellalabad Valley                                                                                                                                                                                                                        | William Simpson, F.R.G.S., <i>Hon. Assoc.</i>                                                              | Jan. 12th, 1880 |
| IV. Architectural Competitions                                                                                                                                                                                                                                             | Thomas Porter, <i>Fellow</i>                                                                               | Jan. 26th.      |
| „ Adjourned Discussion on ditto                                                                                                                                                                                                                                            | Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> ,<br>Professor Kerr, <i>Fellow</i> , and others.              | Feb. 9th.       |
| V. Portland Cement                                                                                                                                                                                                                                                         | Henry Faija, Assoc.M.Inst.C.E.                                                                             | Feb. 23rd.      |
| VI. The Polychromatic Decoration of various Buildings                                                                                                                                                                                                                      | John Pollard Seddon, <i>Fellow</i>                                                                         | April 5th.      |
| VII. Iron as a Material for Architectural Construction                                                                                                                                                                                                                     | James Allanson Picton, F.S.A.                                                                              | } April 19th.   |
| VIII. "Mild Steel" and its applications to Building                                                                                                                                                                                                                        | Prof. Alex. B. W. Kennedy, M.Inst.C.E.                                                                     |                 |
| „ Discussion on Iron and "Mild Steel"                                                                                                                                                                                                                                      | Dr. C.W. Siemens, F.R.S., <i>Hon. Assoc.</i>                                                               | April 19th.     |
| „ Adjourned Discussion                                                                                                                                                                                                                                                     | William White, F.S.A., <i>Fellow</i> , Geo.<br>E. Street, R.A., <i>Past Vice-President</i> ,<br>and others | May 24th.       |
| IX. Presentation of the Royal Gold Medal                                                                                                                                                                                                                                   | John Whichcord, F.S.A., <i>President</i>                                                                   | } June 7th.     |
| X. The Chæroneian Lion                                                                                                                                                                                                                                                     | Professor Donaldson, <i>Past-President</i>                                                                 |                 |
| Notices of Deceased Members: Edward Middleton<br>Barry, R.A., Assoc. Inst. C.E., <i>Vice-President</i> ; Jean<br>Pierre Cluysenaar, <i>Hon. &amp; Corr. Member</i> ; Pascal<br>Coste, <i>Hon. &amp; Corr. Member</i> ; Joseph Louis Duc,<br><i>Hon. &amp; Corr. Member</i> |                                                                                                            | Sept. 16th.     |

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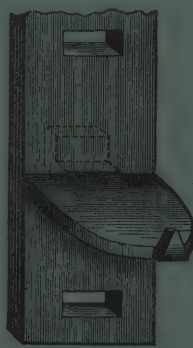
### WETHERED'S PATENT SELF-FASTENING BLIND FURNITURE.

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## Notices of deceased Members.

EDWARD MIDDLETON BARRY, R.A., Assoc. Inst. C.E., *Vice-President*.

EDWARD, third son of the late Sir Charles Barry, was born in 1830, and during the early years of his life was of a very delicate constitution. Educated at a private school at Walthamstow in Essex, he afterwards became a student at King's College (Lond.); and entering the office of Messrs. Wyatt and Brandon as an articled pupil, about a year before the dissolution of their partnership, he served the remainder of his term with Mr. Wyatt. He then became his father's confidential assistant and representative until the sudden death of Sir Charles in 1860, when he was appointed to superintend the completion of the Palace of Westminster: all the drawings, papers and books relating to that building having been bequeathed to him by his father. Admitted a student of the Royal Academy in 1848, he was elected an Associate of the Institute in 1855. Two years afterwards the Church of St. Saviour at Haverstock Hill was erected from his designs; about the same time the present Opera House in Covent Garden was commenced under his direction and completed in less than nine months. A description of this work was given by himself in a Paper read to the Institute.\* He became a Fellow in 1860; the year after, he was elected an Associate of the Royal Academy. Elected an Academician in 1869 he about four years afterwards succeeded the late Sir Gilbert Scott as Professor of Architecture at the Royal Academy—a post which he filled for the usual term of five years, and to which he was a second time appointed. A critical notice of his first course of lectures appeared about two years ago in the newspaper conducted by one of the Past Vice-Presidents of the Institute, and the following extracts afford an idea of the manner in which Edward Barry fulfilled his task as a practical Lecturer on Architecture:—

“The course of twenty lectures upon architecture which Mr. E. M. Barry, R.A., has just concluded,—a course spread over five years,—is of a character to demand more than the ordinary attention usually accorded to such a subject. Lectures, especially those upon Art, have come to be regarded, by the majority of people who are of the world worldly, as the exaltation of theory by professors whose eyes are lifted, like certain philosophers of the satirist, above the snares of mundane practice. Mr. Barry, on the contrary, refuses us the privilege of such a reflection: he is not an artistic enthusiast, but a work-a-day architect; he has been a professor only to show himself a man of the world. Seventeen years before he was called to the Chair of Architecture at the Royal Academy, that chair had been vacated by the elder Cockerell, and of the latter Mr. Barry was not only, like every one else, a respectful admirer but a diligent student. He had been evidently impressed with his elder's style of teaching or train of reasoning; he has succeeded in catching or rather following both, without descending to copy or attempting to imitate his master. In the first place, Mr. Barry has sought to raise the character of architecture as a calling or a profession in the mind of his audience; and M. Viollet-le-Duc did precisely the same thing in his lectures which,—being foolishly precluded from delivering them,—he published in a book. ‘Architecture,’ said the Frenchman, ‘is an art, but not like the *Art de vérifier les Dates*.’ Said the English Academician:—‘It is surely something to have aims and aspirations independent of that money for which men lie and steal and murder.’ Banking, buying and selling stock, mercantile transactions of all kinds, if honourably conducted, are gentlemanlike occupations; but though they increase the wealth and consequently strength of a nation, neither the mode of procedure they involve, nor the results attained, are comparable to the mission of Science and Art, and the influence exercised by both upon the great mass of humanity. An engineer or an architect who has done a great deal of practical work, or who has promulgated theoretically a great many practical suggestions, cannot be said, among a progressive community, to have left

\* See the TRANSACTIONS, Session 1859-60, pp. 53-64.



the world in the world's debt. He has helped, even though infinitesimally, to make the world healthier, more loveable and more comfortable, than it was before his generation; and the successful banker or merchant cannot claim with him an equal share of credit. That was what Cicero meant when he enumerated those professions that 'involve a higher degree of intelligence, or a greater amount of utility, such as medicine, architecture, the teaching the liberal arts,' which he said they were taught to regard as honourable and worthy means of acquiring wealth. Cicero has incurred a great deal of respectable obloquy for that and other remarks in the forty-second chapter of his first book of 'Offices,' from commentators of every description. But too many have judged an era of civilisation, when the property of man in man was at its height, with the experience of our time, when human equality is acknowledged though not acted on. It is, therefore, all the more interesting and important to hear from a modern Academic chair the reiteration of ancient doctrine, confirmed as it is by the deductions and experience of ages, and enhanced with the admonitory caution,—thought necessary even by the Roman philosophers, and, therefore, how much more necessary now need hardly be added,—against the allurements of mere fashion or caprice. Throughout, Mr. Barry has argued and fought, to put it strongly, in the cause of his brethren; and he spoke better even in the fifth than in the first year of his course. He showed how in architecture the practical worker is trammelled by the exigencies not only of fashion but of science, and by the many vacillations of public taste; how the architect, let alone the engineer, has scientific and sanitary problems to solve which were never dreamt of by his predecessors, and how both engineer and architect are implored by opposing schools to proceed in opposite directions. . . .

"Mr. Barry treated of current topics of discussion,—topics which academical traditions have often excluded from the consideration of students; and he was generally happy in a passing allusion to something that a short time before had occupied public attention. Thus when, two years ago, the most popular new buildings seemed to excite admiration, principally because of the eccentricity they displayed, the Academy lecturer explained that the mission of architecture was not to startle, but to satisfy! 'Nature,' said he, 'is never loud; and you should eschew loud architecture.' On the same evening he introduced the subject of London Bridge, which was then the cause of much controversy; and he alluded to the long-debated and ever-deferred improvements of unfortunate London. He claimed for architects an influence on the solution of all such questions as the planning of new streets. His opinion is that Regent Street and its accessories are the best laid-out thoroughfares in London. 'They are well worthy,' said he, 'of consideration as you walk along them from Charing-cross to Portland-place. They were, of course, designed before the traffic had become what it now is. The architecture of the houses is not in accordance with prevailing taste; but I am not asking you to admire or criticise it. I do wish, however, to call your attention to the care and design shown by the general scheme, and we may remember with some satisfaction that it was the work of an architect.' Again, his repetition of a liberal remark made more than once by others elsewhere came with redoubled force from the walls of the Royal Academy: 'While architects have been restoring, engineers have been inventing.' The disputed question of restoration was treated in the fifteenth lecture, the first delivered this year; and the arguments used strengthened the common sense side of the difficulty. . . . He summed up his researches—as most of the thinkers of to-day sum up similar discourses—with the conviction that if artistic considerations were properly regarded, perfect utility need not and should not be inconsistent with architectural beauty; nor scientific devotion necessarily opposed to æsthetic culture. Moreover a healthy confidence in the future and a just appreciation of the present pervaded Mr. Barry's remarks; he did not deplore the fate of living men, or regret his deferred existence in a century of railways and telegraphs. He thought that 'the London and North-Western Railway was as marvellous a work as the Great Pyramid of Gizeh'; he advised architects to carefully consider the signs of the times as regards engineers, and to accept readily the conclusions to be drawn from them."\*

The lectures of his second term of office were left unfinished at the time of his death, which took place suddenly at the Council-table of the Royal Academy on the 27th January, 1880. His connection with that body both as student and professor was touched upon by the President, Sir Frederick Leighton, in a letter written a few days after the melancholy event to Mr. Charles Barry, his elder brother. Sir Frederick continued:—

"It was in 1874, on the resignation of the late Mr. Sydney Smirke, that the high trust of our Treasurership was placed in his hands, and those who know how considerable was his capacity for business will not need to be

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\* From an article entitled "Mr. Barry's Academy Lectures," in the *Builder*, 30th March, 1878.

told that the finances of the Royal Academy were handled by him with ability and success. But his services do not end here. At the death of Mr. Smirke the galleries of our new buildings were left incomplete in an important point—they lacked an adequate and becoming approach. This approach Mr. Barry was asked to provide. The old steep staircase was removed by him, an easy ascent substituted, and, under his design, the present handsome and ornate doorway fittingly united the new galleries to the old vestibule of Burlington House. Other and important modifications were made by him in those parts of the building to which the public has no access, and have added materially to their use and convenience. These, my dear Barry, are in outline the services through your brother which deserve the thanks of the Royal Academy; but it was on other grounds than those that he deserved and enjoyed the personal regard of his brother Academicians, on the grounds, namely, of his uprightness, his genial courtesy, and a dignity of self-control which I have rarely seen surpassed."

Edward Barry was elected a Member of Council for a second time in 1877 and a Vice-President in May, 1879. He latterly took great interest in the work of the Institute; he was Chairman of the Committee of Council appointed to superintend the recent alterations to the premises, and on the formal announcement of his death, Mr. J. Macvicar Anderson, a member of that Committee, spoke of him as follows:—

From the first meeting which we held up to the last moment of our intercourse—an intercourse which I am now happy to think was unruffled by one unpleasant word or thought—I felt impressed by the clear intellect, the calm deliberation, I had almost said judicial mind, that he brought to bear upon all matters with which we had to deal. He appeared to possess intuitively the rare faculty of disintegrating from a mass of general information that which was really vital and pertinent, and putting it before you in a clear, condensed and able form. Possessed with a cultured mind, sound judgment, great practical as well as artistic knowledge, wide experience of life, and genial manners, Edward Barry was one of the ablest architects of our day, one of the most agreeable of companions, and, I am well assured, one of the truest of friends. It is not without reason therefore, for my judgment is based on experience of his work here, that I say—and say deliberately—that his loss to the Institute has caused a void very difficult, if not indeed impossible to fill. It was not my privilege to know Edward Barry nearly so intimately as I could have wished, nor, had it pleased God to spare him, as I had hoped to do. His was one of those characters that the more one knew the more one wished to know; but I knew him just sufficiently well to be now conscious of the great loss I have sustained, and we all have sustained, by his sudden and premature death.

His funeral, which took place at the Paddington Cemetery, Willesden, on the 3rd February, 1880, was solemnized in the presence of a large number of mourners and friends. The pallbearers were the President and the Keeper of the Royal Academy, the President of the Institution of Civil Engineers, the Permanent Secretary of Her Majesty's Office of Works and Public Buildings, as well as the President and the Vice-Presidents of the Institute. The Council of the Royal Academy and that of the Institute were largely represented; most of the best known painters and architects were there, and a few engineers. Among the mourners were several who had been engaged in business with him on many of his works, as well as Sir Henry Hunt who had known him from childhood, and Lord Crewe for whom Edward Barry restored or almost rebuilt Crewe Hall after the last fire, making at the same time considerable additions to the original mansion. From a long list of his professional works may be mentioned the following new residences:—Duxbury Hall, Lancashire; Barbon Park Lodge, Westmoreland; Bakeham House, Egham; "Shabden," Surrey; "Cobham Park," Surrey; and "Wykehurst," Sussex. The new buildings on the Victoria Embankment, for the Societies of the Inner and Middle Temple, were designed and carried out by him jointly with Mr. St. Aubyn; he was also the architect of the two great Railway Hotels at Cannon Street and Charing Cross. A coloured view of the interior of St. Stephen's Crypt, as restored and decorated from his designs, was exhibited at the Paris International Exhibition of 1867; it elicited outspoken



commendation from Viollet-le-Duc who was a member of the jury, and a prize was adjudged to Edward Barry for it. At the Paris International Exhibition of 1878 he received the principal award for architecture in the British Section. One of his earliest works, the St. Giles's Schools at the corner of Endell Street, attracted marked attention at the time of its completion. The Opera House at Malta was erected by the Government from his designs. The New Picture Galleries recently added under his direction to the National Gallery formed part of his design which obtained the first place in the limited competition, held some years ago, for a new National Gallery. The Hospital for Sick Children, near Great Ormond Street, was designed and carried out by him; and the Council of the Art Union of London, in their new building in the Strand, have placed a tablet to his memory as the architect of the work. Among the additions and alterations he made to existing buildings may be cited Henham Hall, Suffolk; Gawthorpe Hall, Lancashire; Bridgewater House (completion of the Picture Gallery); Thorpe Abbots, Norfolk; Esher Lodge; Fitzwilliam Museum, Cambridge (completion of the Grand Staircase); Downing College, Cambridge; Stancliffe Hall, Derbyshire; and, last but not least, the Palace of Westminster. An Academician and the Treasurer of the Royal Academy, he was also a foreign member of the Imperial and Royal Academy of Vienna, and of the Royal Academy of Amsterdam. At the Meeting of the Institute, when the Vice-President's sudden death was formally announced, the President said that he knew many present who would have been able, were it necessary, to give expression in no exaggerated eulogium to the feelings that influenced the majority of them. "Barely twenty-four hours before his death," continued Mr. Whichcord, "Edward Barry had assisted at our own Council-table, and he left us in good will and with a kind word to every member then present. Indeed, he had lately taken much interest in our work, and many of us believed that when called upon in due course to occupy the Chair of the Institute he would have proved himself an accomplished and a powerful President."

JEAN PIERRE CLUYSENAAR, *Hon. and Corr. Member* (Brussels).

**T**HIS gentleman, a well-known architect of Brussels, died at the beginning of the year at the age of sixty-nine. He was made an Hon. and Corr. Member in 1852.

Writing to Professor Donaldson in January, 1868, he described how Bourla, of Antwerp, a Member of the Academy; Suys, architect to the King of the Belgians; Roelandt, architect to the City of Ghent; Renard, of Tournay, were all dead, adding that with the exception of M. Delsaux "*je reste seul des anciens.*" His great work, completed a generation ago, is the *Galérie St. Hubert*, a covered arcade of shops in Brussels, of importance equal to the well-known *Galérie d'Orléans* in the *Palais Royal*, Paris. The following extract from a letter addressed by Cluysenaar, on the 30th December, 1864, to the late Mr. C. C. Nelson, then the Secretary for foreign correspondence, is interesting at the present moment when the *Palais de Justice*, Brussels, approaches completion:—

Le Gouvernement a été forcé par les besoins du service de songer à faire un nouveau Palais de Justice. A cet effet il a institué un concours dont aucun des nombreux plans n'a été jugé digne d'être exécuté. Le Ministre de la Justice, après deux années perdues, a fini par charger Mr. Poelart de faire de nouveaux plans. La somme jugée nécessaire pour l'exécution de ce travail avait été primitivement fixée à six millions de francs. Mr. Poelart

au bout de deux ans arrive avec des plans qui doivent coûter quatorze millions et dont le devis définitif n'est pas encore arrêté. Depuis un an, le Ministre fait vérifier et dresser les devis, probablement qu'un nouveau million viendra s'ajouter aux autres, et qu'on nous dira qu'il faut quinze millions pour faire un Palais de Justice, qui dans le principe tout le monde reconnaissait pouvoir se faire pour la moitié de cette somme. Il a fallu faire voter de nouveaux subsides par les Chambres, la province et la Ville de Bruxelles; tous ces retards ont déjà réclamé cinq années et pour peu que le Ministre de la Justice continue à se hâter lentement, notre génération ne verra pas la fin de ce travail . . . . . On peut donc hardiment compter sur vingt années\* avant d'en voir la fin. Ces plans dont le public ignore le style et le mérite n'ont pas été soumis à la Commission Royale des Monuments, comme c'est l'usage pour les autres projets que le gouvernement fait exécuter. Le Ministre a nommé une Commission mixte, composée en grande partie de magistrats et de trois architectes qui ont approuvé ce travail.

In the same letter he deprecates the habit in Brussels for each family, however poor, to occupy a private house in the English fashion, no matter how small it may be. Holding evidently the same opinion as the late M. Duc, he says:—

“Bruxelles se développe de plus en plus, sa population et ses maisons augmentent, mais malheureusement notre art n'y gagne pas beaucoup. Nos habitudes sont comme les vôtres, chacun veut être maître chez lui, et habiter seul sa maison—ce qui fait autant de maisons que de familles. Ce sentiment est si prononcé que même les ouvriers habitent chacun leur maison. La superposition des logements comme à Paris, Vienne, &c. ne peut réussir ici; on n'en veut pas. D'un autre côté comme nous ne possédons pas, parmi nos habitants, de grandes fortunes, il s'en suit que nos maisons sont petites: en moyenne sept mètres (23 English feet) de façade et deux étages audessus du rez-de-chaussée, avec cuisines souterraines. Nos grands hôtels ne vont guère au-delà de vingt-cinq mètres, encore sont ils rares dans le Quartier Léopold, fort beau quartier bâti sur les hauteurs près du Parc à Bruxelles.”

Cluysenaar, who was the architect of important buildings in Belgium, enjoyed a European reputation and was highly considered in Paris.

PASCAL COSTE, *Hon. and Corr. Member* (Marseilles).

ON the 30th December, 1877, the subject of this memoir wrote in his Diary thus:—  
 “Accablé par les infirmités survenues à l'âge de 90 ans, je me suis vu forcé de clôturer mes courses artistiques et de me livrer au repos, un peu malgré moi, après avoir fait: trente mille lieues, seize navigations à la voile et à la vapeur, et plus de 3,900† dessins et croquis sur les diverses contrées que j'ai parcourues, et après avoir doté ma ville natale de plusieurs monuments et édifices.” Less than fifteen months after writing this Coste died in the ninety-second year of his age, having been born on the 26th November, 1787. The son of a small contractor (*entrepreneur de menuiserie*) of Marseilles, he was placed in 1804 with an architect; ten years afterwards he started for Paris, armed with letters of introduction to MM. Labadié, Percier and Fontaine, architects. With their assistance he was admitted into the *École des Beaux-Arts*, and worked in the architectural class which was then under the direction of Vaudoyer, the father of the late M. Léon Vaudoyer, architect of the new

\* This building, of which M. Poelart is the architect, is approaching completion. A view of it has been recently published in the *Builder*. A translation of Cluysenaar's letter, from which the above passage is taken, is printed in the *TRANSACTIONS*, Session 1864-65, pp. 54-55.

† Three hundred and sixty of these drawings have been engraved and published, with Government assistance, in his three works on Arab Architecture and the Ancient and Modern Monuments of Persia. These books are in the Library: the *Architecture Arabe ou Monuments du Kaire* was purchased, and the *Monuments Modernes de la Perse* was presented by its author; the *Voyage en Perse pendant les années 1840-41*, in six volumes, and the *Relation du Voyage en Perse*, in two volumes, form part of the Tite Donation.



Cathedral of Marseilles. In the summer of the following year Coste returned to Marseilles, and re-entered the office of the architect with whom he had been originally placed. But when in Paris he had made the acquaintance of a learned geographer, who formed part of the famous Scientific and Archæological Commission at the time of the French Expedition to Egypt, and who took much notice of young Coste. By the assistance and recommendation of that gentleman, who kept up a communication with Mehemet Ali, Coste started in 1817, being then in his thirtieth year, for Alexandria, in order to superintend the erection of certain buildings for manufacturing purposes. He was to take with him a *maitre-maçon*, and the agreement was for one year. Coste, however, remained ten years, and returned to Marseilles after a voyage of 39 days from Alexandria in January, 1828. At the end of the following year he published a Map of Lower Egypt from his own measurements taken between 1818 and 1827, and he dedicated his work to Mehemet Ali. In 1832 he made his first trip to Italy; the following year, having arranged his drawings of Arab Architecture for publication, he went to Paris, submitted the drawings to the Minister of Fine Arts, and obtained a Government grant of 25,000 francs (£1,000) to defray the expense of their publication. In 1835 he went to Tunis; in 1837 he was at Amsterdam and in parts of Belgium. The year afterwards the French Embassy to Persia started from Toulon; it included Coste, architect, and Flandin, painter. This journey occupied Coste more than three years. Touching on his way at Palermo, Athens, Constantinople and Trebizonde, he went thence over the plains of Armenia through Erzeroum and Bayazid to Persia; returning by way of Bagdad, Diabekir and Aleppo to the coast, he touched at Cyprus, Smyrna and Malta, and arrived at Marseilles on the 4th of February, 1842. A month afterwards he had the honour of submitting the drawings executed during his tour to King Louis Philippe, who made him a Knight of the Légion d'Honneur, and authorized him to wear the decorations given him by the Persian Sovereign. In June of the same year he arrived in London, and his first visit was, in his own words, to "M. Donaldson, architecte, très-aimable et très-obligéant," who gave him letters to Messrs: Cockerell, Hardwick, Alexander and Owen Jones. He describes in his Diary a visit he paid to Sir Charles Barry on the 13th June, 1842, and notes that the same evening he was present at a meeting of the Institute of British Architects. Under orders to go to Tangier and Morocco he started in September, 1847, returning by Gibraltar to Malaga, and, coasting Spain, touched at Barcelona on his way back to Marseilles. He paid a second visit to Spain in 1861, having previously made excursions on the River Garonne and in the Pyrénées with his friend the late M. Duc. In the following year he was again in London, and saw the International Exhibition of 1862 with Professor Donaldson and the late Mr. Bonomi, whom he had known in Egypt. It was during this visit that he went to Dublin and Belfast, crossing thence to Glasgow and returning by Edinburgh, Newcastle and York to London. Not long afterwards he was at Geneva, Hanover, Hamburg, Berlin and Vienna, and for a third time visited Italy. He was in Paris in 1867, and made eighteen visits to the Great Exhibition, being then eighty years old. Five years later he was at Copenhagen, Stockholm, St. Petersburg, Moscow, and he returned on Christmas-day, 1875, to Marseilles. He mentions in his Diary a visit he received on 9th February, 1872, from the late Mr. T. H. Wyatt; and in June, 1876, he was again in Paris, when he happened to call on Duc just after his arrival from London, where notes he, in his

Diary, "Duc a obtenu de la reine Victoria la grande médaille d'honneur accordée aux architectes étrangers les plus distingués par leurs travaux architecturaux." Hardly a year seems to have passed, excepting of course during the periods of Coste's travels in Asia and Africa, that he did not take an opportunity of visiting some part of his native country, every corner of which appears to have been seen by him, and every building of value contained there noted or sketched. So late as 1875, when he was in his eighty-eighth year, he paid a visit to Viollet-le-Duc, who then gave him advice as to a tour he wished to make in Normandy. Some few days after, on the 17th June, he was at Evreux, where, to quote his words, "Je m'empressai de lever le plan de la cathédrale et de faire deux croquis extérieurs de ce remarquable édifice de 111 mètres de longueur." At Bayeux and St. Lo he made sketches; at Coutances he took a plan of the cathedral, and after having made two sketches of the exterior he continued his walk through the town to see the churches of Saint Nicolas and Saint Pierre. He returned through Tours, Toulouse, Montpellier and Nîmes to Marseilles, which he reached on the 1st August, thus completing a two months' sketching tour, and noting the day after his arrival home: "fait mes visites aux parents et amis, et continué à passer à l'encre les divers croquis faits pendant mon excursion." In a review of Coste's work on "L'Architecture Arabe," Viollet-le-Duc gave a characteristic description, some passages of which are here translated:—"A sort of pioneer of Archæology, M. Coste only stops when his strength fails him, and happily it has never failed him. Do not go thinking that Coste is a kind of man of war, robust, imposing, knowing like certain English and Americans how to make room for himself everywhere. No. Coste is a little man, timid in appearance, lame in consequence of a broken leg, taking the least possible room wherever he finds himself; but in his quick eye, in a smile at once kind and a little sly (*narquois*), in a certain squareness of forehead, one of those natures, vivacious and persistent, which find the means of arriving at their ends, is very quickly recognized. When one knows the man well and the East a little, one understands how M. Coste has been able to pass everywhere and draw everywhere as in his office. . . . Expect nothing from M. Coste but a simple description, some dates, some historical facts relating to the edifices he has engraved; and then that's all. He leaves the public to make deductions, he journeys hundreds of miles, never mind how, and passes to another building. I confess that this modesty, antique after the fashion of Herodotus and Xenophon, is a considerable advantage: this is homage that I am pleased here to render to our venerable senior (*doyen*), M. Coste."

Pascal Coste was elected an Hon. and Corr. Member of the Institute in 1842. A long and valuable communication,\* dated the 17th December, 1864, describing the various improvements and additions executed or in course of execution at Marseilles, was addressed by him to the then Hon. Secretary, the late Mr. Nelson. It is in Coste's own hand, written in the clearest and most careful manner, and it is preserved in the Institute library. He begins with an unaffected recognition of the example set by the French capital under the Second Empire, stating that "les grands travaux exécutés à Paris dans ces dernières années ont, vous

\* A brief translation of this was published in the *TRANSACTIONS*, together with other letters from Hon. & Corr. Members, under the title of "Some information forwarded from abroad, &c."—See the Volume for 1864-65, pp. 55-59.



le savez, excité l'émulation des principales villes de France qui ont voulu, comme la capitale, se donner de larges voies de communication, des promenades publiques, des monuments, &c. Marseille n'est point resté en arrière; de grand travaux publics et particuliers y ont été entrepris." Then follows a description of the vast alterations made to Marseilles. This letter included a reference of importance to the radical change in the mode of town-habitation, which had long been taking place in the provincial capitals of France. His words are:—

"Il va sans dire, Monsieur et cher confrère, que les constructions privées se sont singulièrement multipliées, vu l'état de l'accroissement de population que je vous signale, ainsi que de l'ouverture de quartiers nouveaux et de percés effectués dans les anciens quartiers de la ville. De nombreuses maisons à trois croisées et à deux de façade, et d'un aspect fort triste, ont été démolies et remplacées par de vastes maisons élevées de six étages, la plupart très-riches de moulures et d'ornementation. Est-ce à dire que toutes ces bâtisses, qui ne sont pas sans prétentions, sont marquées au cachet de l'art et de bon goût? Il en est loin d'être ainsi. Il en résulte cependant un progrès dans la mise en œuvre des matériaux et dans les tendances artistiques de la population."\*

Several communications of a similar kind have passed between M. Coste and the Institute. A recent reference made to him in the *TRANSACTIONS* occurred during the discussion on "The question of Oak or Chesnut in old timber roofs," in a letter† received by the late Mr. F. P. Cockerell from M. Henri Révoil, *Hon. and Corr. Member* (Nîmes). This last-named gentleman had been solicited for information concerning the use of chesnut in old roofs, and after stating a few facts he added:—"J'en ai causé avec notre doyen, M. Pascal Coste, notre digne confrère; il n'a eu dans ses souvenirs—lui qui connaît si bien la France—aucune charpente de bois de châtaignier à me signaler. Ce beau vieillard est vraiment admirable: à 90 ans passés, il dessine encore avec la sûreté de main d'un jeune homme, et s'occupe à remettre en ordre tous les précieux croquis de ses longs et nombreux voyages."

It might fairly be inferred that Pascal Coste, though an architect, was remarkable principally for his powers as a traveller, a draughtsman and a critic. But Coste designed and superintended the erection of the Palais de la Bourse at Marseilles, a building commenced in 1854 and completed in 1862, the construction of which involved an expenditure of 3,200,000 francs (£128,000). He was also the architect of the Church of St. Lazaire, the Church of St. Joseph, the Church of St. Barnabé, the Marché de la Place de Rome (built in 1845), the Church of Mazargues (finished in 1849), the Abattoir de Marseille, the Chapel of the Cercle Religieux (1860), and of a large mansion erected in 1846 on the Place des Chartreux, together with several smaller works, all being situated in his native town. He was Professor of Elementary Architecture at the École des Beaux-Arts of Marseilles, and a Corresponding Member of the Institut de France.

The following extracts from Coste's Diary in 1851, 1855, 1862 and 1867, the years of International Exhibitions, serve to show the kind of memoranda he was in the habit of writing during his numerous tours. Thus:—

1851.

Le 25 Mai, malgré une forte grippe, départ pour Paris (en diligence), avec autorisation de la Chambre de Commerce; arrivé le 28; logé à l'hôtel de Valois, rue Richelieu.

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Le 30 Juin, visité les nouveaux édifices construits à Paris: le Timbre, par Baltard; la Mairie du troisième arrondissement, par le même; la Bibliothèque Sainte-Geneviève, par Labrousse; les travaux du Palais de

\* See a similar appreciation of the same subject by M. Cluysenaar, p. 205 *ante*, and M. Duc, p. 216.

† See the *TRANSACTIONS*, Session 1877-78, p. 237.

Justice, par Duc. Le Conseil des Bâtiments Civils a approuvé mon projet de Bourse avec quelques modifications à la façade et au plan. Il l'a adressé au ministre.

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Le 14 Juillet, départ de Paris pour Marseille en chemin de fer et en diligence ; arrivé le 15 au soir à Marseille. Le 17 repris mes habitudes ordinaires.

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Le 1<sup>er</sup> Décembre, départ pour Paris, afin de faire accélérer l'approbation du projet de Bourse par le ministre. En route très-fort mistral jusqu'au pont de l'Isère ; après, calme. Le 2, en arrivant à Chalons, l'on apprit le coup d'état et l'insurrection dans Paris. Arrivé le 3, à dix heures du soir, dans la capitale. Les carrefours, les places sont occupés par la troupe de ligne avec de l'artillerie et mèches allumées, de nombreuses patrouilles parcourent les rues. Arrivé à onze heures du soir à l'hôtel de Valois, rue Richelieu.

Le 4, des fusillades se faisaient entendre dans la rue Richelieu, et quelques barricades sur les boulevards furent enlevées par la troupe de ligne. Je restai par prudence dans ma chambre.

Le 5, tout était tranquille. Je pus faire mes visites au Conseil des Bâtiments, à M. Caristie, son Président ; à M. Achille Leclère, rapporteur sur le projet de Bourse, et aux amis et connaissances, tous consternés du coup d'état de Louis Napoléon, proclamé président absolu.

Le 12. Paris est tranquille. Le Conseil des Bâtiments Civils a approuvé mon projet de Bourse rectifié. On l'a expédié le même jour au ministre.

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Le 18, départ de Paris, en route, partie en diligence et partie en chemin de fer ; arrivé à Marseille le 20 au soir. Tout est tranquille.

1855.

Le 14 Septembre, départ pour Paris ; arrivé dans la capitale le 16 au matin. . . . . Première visite à l'Exposition internationale, aux Champs Élysées. Parcouru toutes les salles de onze heures à six heures du soir.

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Le 25, sixième visite à l'Exposition. Parcouru les galeries supérieures du grand bâtiment. Les produits des Indes, de la Chine, de Constantinople et de Tunis, très-curieux, et une partie des produits Français.

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Le 5 Octobre, visité les travaux du nouveau Louvre. L'inspecteur principal m'a fait parcourir tous ces travaux ; il m'a donné de bons renseignements sur les planchers et les charpentes en fer. . . . . Après, dixième visite à l'Exposition. Salles des Beaux-Arts : l'architecture est très-remarquable par les beaux dessins des restaurations de MM. Duban, Caristie, Vaudoyer, Duc, Labrousse, Viollet-le-Duc, Pacard, Titeux, Morey, Questel, Normand, Baltard et autres.

Le 6. Assisté à la séance publique dans la grande salle de la Rotonde de l'Institut, pour la distribution des grands prix de Rome : peinture, sculpture, architecture, gravure et musique, sous la présidence de M. Ambroise-Thomas, M. Lemaire, vice-président, et M. Halévy, secrétaire-perpétuel. Quatre membres correspondants ont assisté à cette séance : MM. Zante, architecte à Cologne ; Cockerell et Donaldson, architectes à Londres, et Pascal Coste, architecte à Marseille. Comme d'habitude la salle était comble avec beaucoup de dames. La musique a terminé la séance. Le soir, dîner de vingt-deux membres au Palais-Royal.

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Le 14, treizième visite à l'exposition : partie aux salles des Beaux-Arts et partie dans le grand bâtiment où sont les industriels. La foule des curieux était innombrable.

1862.

Le 1<sup>er</sup> Juillet, départ pour Londres, à sept heures du matin ; embarqué sur le bateau à vapeur *Orléans*. Mauvaise traversée, vent et grosse mer. Debarqué à Newhaven. Traversé un pays bien cultivé en pommes de terre, blé, orges, pâturages et bois. Arrivé à Londres à sept heures du soir ; logé à l'hôtel Sablonière, Leicester Square.

Le 2, visites à M. Donaldson, architecte, et à M. Bonomi, sculpteur. Après, M. Donaldson m'a conduit à la grande Exposition internationale. Parcouru ensemble toutes les salles ; c'est très-curieux. L'intérieur richement décoré et peint. Les divers escaliers en bois, petits et mal disposés. Les façades extérieures en briques jaunes d'un mauvais effet. L'intérieur est très-bien éclairé. Nous avons mis six heures pour parcourir l'ensemble de cette exposition. . . . .

Le 3, pluie toute la journée. Visite à M. Bonomi (ancien ami d'Égypte), conservateur du musée de Sir

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John Soane (ancien architecte). Ce musée est très-curieux par ses marbres, ses moulages grecs, romains, moyen-âge, vases étrusques, vitraux, manuscrits du moyen-âge, et une bibliothèque d'ouvrages d'art et de dessin. . . . . Deuxième visite au palais de l'Exposition. Parcouru les salles des tableaux; l'école anglaise est très-complète par ses tableaux anciens et modernes.

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Le 5, deuxième visite au Soane Museum. . . . . Ensuite, avec M. Bonomi, nous avons fait une course en chemin de fer au château de Hampton Court. . . . . Après . . . . . nous avons visité le Jardin Botanique de Kew, très-vaste et très-beau. . . . . À Kew nous avons pris le bateau à vapeur sur la Tamise pour retourner à Londres à huit heures du soir avec la pluie. Après le dîner dans un restaurant Français nous sommes allés au Royal Academy, place Trafalgar, voir l'exposition des tableaux des peintres vivants, éclairés au gaz jusqu'à dix heures et demie du soir. . . . . En somme, les productions des artistes de Londres ne m'ont point satisfait.

1867.

Le 17 Juillet, quatorzième visite à l'Exposition. Parcouru la galerie des machines. Ensuite, visité en détail le Temple Égyptien. . . . . Il est fâcheux que ce temple modèle ne soit pas exécuté dans ses proportions. . . . . Le palais du Vice-roi d'Égypte est charmant de détails d'ornementation et d'une parfaite exécution dans le style arabe. *L'okel* ou caravansérail du Caire avec les ateliers des indigènes arabes, comprenant les brodeurs, les nattiers, les tourneurs et autres, réunis chacun dans sa boutique, sont bien représentés.

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Le 19 Juillet, seizième visite à l'Exposition. . . . . Les pays où il y a un groupe sérieux d'artistes sont la Belgique et l'Angleterre; celle-ci pour les aquarelles et les lithographies.

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Le 22 Juillet, dix-huitième et dernière visite à l'Exposition universelle . . . . .

Le 23, à midi, avec M. de Biberstein-Casimirsky, orientaliste, et M. Morel, Libraire-éditeur, nous nous sommes rendus au Palais des Tuileries, d'après l'avis que nous avons reçu du Chambellan de l'Empereur, pour présenter à S. M. un exemplaire richement relié de mon ouvrage sur les *Monuments modernes de la Perse* . . . . . il l'a examiné avec attention et il a témoigné sa surprise qu'en Perse il y eut de si beaux et intéressants monuments, en nous remerciant de l'hommage que nous lui adressions. Nous nous sommes retirés à demi-satisfaits de cette réception. . . . . Je suis rentré dans mon hôtel pour faire ma malle.

In fine, the two octavo volumes\* from which the foregoing extracts are taken, and which together consist of 1,100 closely-printed pages, enriched with a host of illustrations, form the history of sixty years of Pascal Coste's life—an astonishing record, modestly narrated by himself, of an extraordinary career.

JOSEPH LOUIS DUC, *Hon. and Corr. Member* (Paris).

**B**ORN at the commencement of the present century, Joseph Louis Duc received his early education at the Collège Bourbon in Paris, and afterwards entered the *atelier* of Chatillon, an architect. Admitted a student of the École des Beaux-Arts he won in 1825 the Grand Prix de Rome for a "Projet d'Hôtel de Ville" for Paris; and arrived the same year at the French School in Rome. He was one of seven young men, afterwards distinguished

\* *Memoires d'un Artiste—Notes et Souvenirs de Voyages (de 1817-1877)*, by Pascal Coste, Architect,—2 vols., Cayer & Co., 57 Rue Saint Ferréol, Marseilles, 1878. A copy of the book, presented to the Library by M. Coste, bears his autograph dated from Marseilles, 7 November, 1878. Other smaller works by him are also in the Library, viz.:—*Rapport de P. Coste chargé avec E. Flandin d'une mission scientifique en Perse*; *Palais de la Bourse de Marseille*; and *La Cathédrale de St. Pétersbourg—la future Cathédrale de Marseille*.

architects, who entered that school between the years 1820 and 1830, namely:—Blouet in 1821, Gilbert in 1822, Duban in 1823, Henri Labrouste in 1824, Duc in 1825, Léon Vaudoyer in 1826 and Constant Dufeux in 1829. During his five years' stay in Italy he visited Naples, Pompeii, Pæstum and Sicily, in company with Henri Labrouste; meanwhile the course of events at home was leading to the Revolution whereby Charles X. was displaced by Louis Philippe, the Citizen King. On the 10th March, 1833, the French Government decreed that a bronze column should be erected in honour of the citizens killed on the 27th, 28th and 29th July, 1830, and the cost of the monument, which was to be placed on the site of the Bastille, was ordered not to exceed the sum of 900,000 francs (£36,000). The architect chosen by the Minister of Public Works was M. Alavoine, who had years before been commissioned to erect on the same site a fountain surmounted by an elephant, and known as the Fontaine de l'Éléphant. But Alavoine's death occurred at the end of 1834, the foundations of the monument having been commenced in the course of that year; and Duc was the *inspecteur des travaux* employed on the works under the direction of Alavoine—the position being that of a confidential assistant rather than of a clerk of works as understood in England. Duc had moreover distinguished himself by a design for the restoration of the Colosseum; and he was appointed to succeed his master in carrying out the design and construction of the monument. Some time however elapsed before the works, stopped by the death of Alavoine, were continued, and there is every reason to believe that important modifications were made in the design. Although it stands on the foundations laid under the direction of Alavoine, the Colonne de Juillet is known to be the work of Duc, and indeed on its completion was immediately acknowledged to be solely his. On the 28th of July, 1840, ten years after the Revolution of July the celebrated monument was inaugurated. The bodies of the citizens who died in defence "*des lois et des libertés publiques*" were solemnly disinterred and borne to the vaults beneath the new Column; and the next day its architect, Joseph Louis Duc, received the following letter:—

*Paris, le 30 Juillet, 1840.*

MONSIEUR,—Il y a foule à votre Colonne; vous pouvez bien croire, par l'intérêt que je porte à vos succès, que je n'ai pas été des derniers à me rendre sur le terrain dont elle fait aujourd'hui l'ornement. Le tertre élevé de ce terrain, le triple soubassement, graduellement et largement empâté, sur lequel repose celui de la Colonne, donnent un élané et une grande élégance à tout le monument. Sans entrer dans les minutieux détails, qui sont tous soignés, je vous dirai, Monsieur, que le piedestal de bronze m'a paru d'un accord parfait avec la Colonne. La Colonne elle-même est d'une élégante et noble proportion. Ses bandeaux, sa base, son chapiteau, son fuselé, ajoutent à sa grâce. Les ornements sont pûrs et d'un excellent goût, leur choix et la discrétion de leur emploi sont louables. Plusieurs prétendent que la statue est un peu petite; je la trouve dans un très-bon rapport; sa proportion, la légèreté d'une figure volante d'un génie aérien, rendent à la Colonne le caractère gigantesque, sans lourdeur, que doit présenter le monument—caractère que vous avez sûrement voulu donné, et que vous avez réussi à lui imprimer. Le public et quelques statuaires même préfèrent souvent la lourdeur à la délicatesse; c'est une erreur. Souvenons-nous des héros colosses du Pont de la Concorde, que le bon goût a fait descendre de dessus leurs pedestaux monstres.

J'ai été, Monsieur, trois jours de suite, voir votre monument, et chaque fois j'y ai découvert de nouvelles beautés. Je l'ai vu par un très-beau temps, de près et de loin, et sur toutes ses faces, se dessinant tantôt sur un léger nuage blanc, tantôt sur un fond de ciel d'Italie du plus bel azur, et présentant toujours l'aspect le plus agréable. Vous devez juger, Monsieur, d'après les heureuses impressions que j'ai éprouvées dans cet examen sommaire, que les expressions me manquent pour vous rendre les félicitations que méritent vos talents et le beau monument qu'ils viennent de produire. Cet œuvre inscrit votre nom au Temple de Mémoire, le

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\* A duplicate, in MS., of Vaudoyer's letter is catalogued in the Library.



transmettra à la postérité, et vous obtiendra les récompenses qu'il mérite. Recevez en donc, Monsieur, mes sincères compliments, et jouissez, avec Madame votre digne et très-aimable mère, de la réputation que vous acquiert un travail aussi difficile, amené à terme avec autant de talent et un aussi heureux succès.

J'ai vu aussi vos brillantes décorations accessoires qui sont très-convenables ; mais c'est un travail fugitif et *festarolien*, qui a du vous donner beaucoup de mal : je m'abstiens de m'en entretenir ici avec vous, pour rester tout entier sur le premier sujet de cette lettre, qui me fait partager votre bonheur.

Agréez les sentiments d'estime et de considération distinguée avec lesquels je suis, Monsieur, votre affectionné confrère et dévoué serviteur,

(Signed) VAUDOYER.

The writer was no less a person than a member of the Institut de France, namely Antoine Laurent Thomas Vaudoyer,\* Professor and Secretary-archivist at the École des Beaux-Arts, having an official residence at the Louvre, the father of Léon Vaudoyer,\* who was Duc's companion at Rome, Naples and Palermo, and one of the most distinguished elders of the French school. It is probably difficult for anyone in England, unacquainted with the sort of respect entertained for members of the Académie des Beaux-Arts among the younger and lower ranks of French artists, to appreciate the valuable compliment conveyed to the comparatively young Duc by Vaudoyer's letter. On the day on which it was received Duc was made a Knight of the Légion d'Honneur, and a few days afterwards succeeded M. Huyot as architect to the Palais de Justice, a post which he held and to which he devoted himself exclusively until his death.

Few *first* works have received a greater meed of admiration than Duc's Colonne de Juillet. Pascal Coste went to the Place de la Bastille expressly to make a sketch of "la belle Colonne, à M. Duc, architecte." M. César Daly devoted several articles in his *Revue* to a historical and critical consideration of this work. "Ce monument," wrote he, "doit attirer l'attention des artistes pour plus d'une raison. Sa composition est conforme aux principes de cette nouvelle école qui n'entend pas limiter son imagination à la reproduction de monuments consacrés, de quelque époque qu'ils soient du passé ; monuments antiques, monuments moyen-âge, monuments de la Renaissance, tous sont pour elle de l'histoire, et, à ce titre, ils lui fournissent des motifs d'inspiration. . . . C'est la France qui est à la tête de ce mouvement, c'est de notre pays que part cette heureuse réforme que veulent à la fois la raison et la passion. L'Allemagne et l'Angleterre sont encore en adoration devant les débris du vieux monde, l'Italie moderne ne compte plus dans l'art architectural ; ce sont les artistes français seuls qui cherchent des voies nouvelles. . . . La Colonne de Juillet est d'ailleurs le plus grand monument de ce genre qui ait encore été fait." Mr. Fergusson, enumerating all the faults he perceived in the Colonne de la Grande Armée at Boulogne, admits that they were avoided in the Colonne de Juillet erected on the site of the Bastille. "Of modern columnar monuments," he writes, "this is certainly the most successful. It is elegant and classical in its details and reasonably appropriate to its purpose. . . . It is certainly a step in the right direction, and if persevered in we may yet see a monumental column worthy of its purpose."†

Duc's connection with the works of the Cour de Cassation and the Palais de Justice endured for thirty-nine years, during which he appears to have been engaged on only one

\* Vaudoyer, the elder, died in 1846 at the age of 90 ; he was one of the earliest Hon. & Corr. Members. Léon Vaudoyer, architect of the Cathedral of Marseilles, was also an Hon. & Corr. Member ; he was born in 1803, and died suddenly in the 69th year of his age.

† *History of Modern Architecture*, by James Fergusson, D.C.L., F.R.S., 2nd edition, 1873, p. 261.

other minor building and a villa erected for his own occupation. In his great work, at the Palais, he was associated as is usual in France with other architects, who held positions under him. A French critic writing in 1868, in the *Revue*, declared that the work of MM. Duc and Dommey owed its success "à la fusion savante que ces artistes ont su opérer entre le goût élevé de l'antiquité et le positivisme inséparable du progrès de notre temps." Some ten years ago the late M. Viollet-le-Duc described Duc's building as a work in which "la décoration tient à la structure, l'appuie même et ne manque par cela ni de grandeur ni d'originalité. La Salle des Pas Perdus (the present vestibule to the Cour de Cassation) extérieurement et intérieurement, est un de ces monuments qui fera honneur à notre temps. Là tout se tient; tout est lié par une pensée claire." Again, on the 10th June, 1875, Pascal Coste enriched his Diary with the following:—"Course au Palais de Justice. Le grand perron est terminé; la façade se développe, sur toute sa longueur, en face de la Place Dauphine, et produit un grand effet. Honneur à M. Duc, qui l'a conçue!" In a leading article on Duc which appeared in the *Builder*, a short time before he paid a visit to England to receive the Royal Gold Medal (1876), the "great work of the day" is thus referred to:—

"There are modern works, even in England, more captivating in effect, and in which the superficial elements of beauty are more strongly marked; but since the revival of letters none have been erected which give with greater decision truthful expression to the thought and aim of the constructor than this one. Not original, not fantastic it attracts neither by eccentricity of construction or of details, nor by bits of ornament or masses of sculpture. How simply the means to an end have been used at times convince without astonishing the matter-of-fact inquirer. The new Salle des Pas Perdus (now the vestibule to the Cour de Cassation) is Greek in its closed portico, Roman in its arcades, Mediæval in its vaulting, French in its general effect. It is symmetrical without any forced regularity, utilitarian and not crude, classical yet devoid of pedantry. It proves not so much the genius of the architect as the pliability of "Orders," "Rules" and other antique impedimenta. The force of reason and common sense is there displayed in the manipulation of hard and cold materials, and its completion establishes a fact—promoted without a doubt by prolonged archaeological researches in both Greek and Gothic fields of art—that all the constructional forms of every country may be so adapted to the style and habits of the present time as to produce a harmonious result, provided always that the cognate principles of ancient and mediæval architecture be scrupulously followed and developed."

The new portions of the group of buildings, of which the Palais de Justice is a principal part, were only partially injured in the great incendiary fires of 1871; but the Palais proper, so to speak, was almost entirely destroyed. An interesting description of the effect of fire upon various materials employed in the construction of both the old and new buildings was communicated by Duc to the Institute, and it is here printed for the first time:—

162, Rue de Rivoli, Paris, ce 18 Juin, 1872.

MONSIEUR ET TRÈS-HONORÉ CONFRÈRE,—J'ai reçu la lettre que vous m'avez fait l'honneur de m'adresser pour me demander divers renseignements sur les effets produits par l'incendie du 24 Mai, 1871, dans les constructions du Palais de Justice. . . . Vous apprécierez sans doute combien il doit m'être sensible d'avoir à exposer devant des étrangers les détails d'une situation aussi affligeante, et à y chercher un sujet d'étude au profit de la science. Je comprends néanmoins l'intérêt général de cet examen au point de vue de la construction et des études architectoniques et je me fais un devoir de vous adresser le résultat de mes observations. . . . La destruction presque totale de l'ancienne Salle des Pas Perdus a tenu à une cause particulière. Les architectes s'occupaient d'en reconstruire les voutes dans un système mixte composé de fer, de pierre et de maçonnerie légère. Les échafauds et planchers nécessaires à ce travail, qui étaient considérables au moment où ils ont été incendiés, ont produit l'effet d'une charge de bois allumée dans un four. La pierre des grands arcs doubleaux, des voutes, des piles et des arcs qui divisent la Salle en deux nefs, ainsi que celle de la décoration architecturale des murs ont été calcinées, et il a fallu par mesure de prudence faire tomber plusieurs des parties qui restaient debout. La pierre ainsi brûlée présente à la surface des parties qui s'en détachent par plaques de diverses



épaisseurs. La profondeur des parties calcinées varie de 0<sup>m</sup>. 00<sup>c</sup>. à 0<sup>m</sup>. 30<sup>c</sup>. La surface des parements ne présente souvent à l'œil aucune apparence de détérioration mais en la frappant d'un léger coup sec avec un marteau on s'aperçoit que la pierre est calcinée. En général toutes les constructions en pierre qui étaient en proximité du bois et étaient revêtues de lambris de cette matière ont subi des effets analogues et très-graves; le grand escalier monumental qui montait de la Salle des Pas Perdus au Tribunal Civil et qui était revêtu d'une chemise de bois pour le préserver a été entièrement détruit. La pierre dure n'a pas mieux résisté que la pierre tendre. Le granit même a subi des effets semblables et, à la Colonne de Juillet, deux côtés d'une assise de cette matière qui appartenaient au soubassement carré doivent être renouvelés. Les constructions en briques, celles de choix surtout, ont bien résisté à l'action du feu; les joints seulement ont été altérés et ce mode de construction est certainement le préférable si l'on ne considère que la résistance aux incendies. Le fer présente de nombreux avantages sur le bois dans la composition des planchers et des combles des bâtiments; néanmoins il ne faut pas croire que cette matière préserve absolument les monuments d'être détruits dans le cas d'un incendie. Divers effets très-variés sont dignes d'être signalés dans les bâtiments qui ont eu à en souffrir. Dans les planchers construits en fer à double T les solives se sont courbées en guirlande. Il en a été de même pour des poutres construites en tôle et cornières au point que beaucoup de ces pièces ont dû être déposées et refaçonées pour leur ré-emploi. Quelquefois ces pièces ont éprouvé dans leur longueur un mouvement sinueux ou serpenté dans le sens de leur projection verticale. À la grande Salle des Pas Perdus des grands arcs en tôle et cornières qui avaient 1<sup>m</sup>. 00<sup>c</sup>. de hauteur de l'intrados à l'extrados, avec une âme en tôle de 0<sup>m</sup>. 01<sup>c</sup>. d'épaisseur et ayant 18<sup>m</sup>. 00<sup>c</sup>. de courbure développée, ont été tordus comme des rubans et ont pris les formes les plus extraordinaires selon les causes de résistance qui ont précédé leur chute. D'autres effets non moins intéressants doivent être remarqués malgré la simplicité des causes naturelles qui les ont produits: les effets de dilatation par la chaleur et ensuite de retrait après le refroidissement ont été souvent cause d'effets désastreux sur les murs construits en pierre. Ainsi les poutres en fer qui portent les planchers d'un bâtiment ayant leurs extrémités chaînées par des ancrés dans les murs ont trouvé une résistance de dilatation et de retrait; il en est résulté un ébranlement dans les murs au point que des assises ont été ou brisées ou déportées en saillie sur l'aplomb du mur. À la grande façade nouvelle, tournée vers le Pont Neuf, la force et la pesanteur des constructions en pierre, ainsi que la longueur des ancrés ont présenté une résistance à cet ébranlement; mais alors les fermes du comble, composées de tôle et cornières, qui étaient entretoisées entre elles par un hourdis en briques et ne pouvaient se serpenter, se sont soulevées à leur sommet par l'effet de la dilatation et en même temps toutes les aiguilles pendantes qui rattachaient les poutres du plancher aux arbalétriers des fermes se sont brisées. À ce moment le plancher n'étant plus soutenu s'est affaissé sur les voûtes inférieures qui heureusement ont résisté à sa charge; et on a remarqué que toutes les aiguilles indistinctement en se brisant avaient affecté la forme d'un crochet. Il est utile de faire remarquer que des poutres en fer et revêtues de briques ou simplement d'un hourdis de plâtre ont beaucoup mieux résisté à l'action du feu que celles dont les fers étaient à découvert. Il faut aussi citer un détail curieux: les ornements en carton pierre ont été peu altérés et malgré la force du feu dont les flammes léchaient les plafonds l'ornementation en carton pierre y est restée presque conservée. Les couvertures, qui sont généralement en ardoises au Palais de Justice, ont toutes été anéanties dans les bâtiments incendiés. C'est particulièrement le voligeage en bois de sapin léger qui a été l'aliment de l'incendie et la cause de leur destruction. Tous les plombs des couvertures et des chéneaux ont été ou fondus ou détériorés; il faut y ajouter avec de grands regrets tous les plombs ornés de crêtes et épis qui décoraient ces couvertures. Je ne dois pas oublier parmi les parties très-regrettables les combles des tours gothiques et celui de l'ancienne Grand Chambre du Parlement. La charpente de ces combles était d'un beau style gothique et très-intéressante par sa construction et sa décoration. Parmi les pertes je ne puis m'abstenir de mentionner celles des deux nouvelles salles d'Assises qui venaient d'être achevées et qui contenaient des travaux et des ouvrages exécutés à grands frais tels que lambris, mobilier, plafonds ornés de peinture et de sculpture. La perte des parties incendiées au Palais de Justice, y compris les bâtiments de la Cour de Cassation, peut-être évaluée à sept millions de francs (£280,000) et demandera au moins six ans pour être réparée. Voilà, Monsieur et honoré confrère, les renseignements que je puis vous fournir sur les désastres causés par l'incendie du 24 Mai, 1871, dans les bâtiments du Palais de Justice et de la Cour de Cassation. Puissent ils ne présenter à vos heureux compatriotes d'autre intérêt que celui d'une curieuse étude dont ils n'auront jamais à faire l'application, surtout dans les douloureuses circonstances où s'est trouvée notre chère ville de Paris.

Agréez l'assurance des sentiments distingués et respectueux avec lesquels je suis votre très-obéissant serviteur,

MONSIEUR F. P. COCKERELL.

(Signed) L. DUC.

In the following year Duc, in response to a request from the late Mr. Cockerell to be furnished with information respecting the more important works then recently completed in Paris, sent another communication. Duc's opinions of the buildings erected by colleagues, now like him deceased, are freely given in this letter, which also contains criticisms of works executed by MM. Ballu, Garnier and Vaudremer. The letter is here printed almost in its entirety :—

162, *Rue de Rivoli, Paris, ce 15 Avril, 1873.*

MONSIEUR ET TRÈS-HONORÉ CONFRÈRE,—J'ai reçu il y a une quinzaine de jours la lettre que vous m'avez fait l'honneur de m'adresser . . . . . Nous sommes toujours ici très-sensibles, et moi particulièrement, croyez le bien, à l'intérêt que vos compatriotes témoignent pour le progrès de notre art en France. De votre côté vous devez être persuadé de notre désir de nous tenir au courant des œuvres nouvelles qui donnent une si belle place aux architectes de votre grand pays par leur initiative dans les inventions de l'art et de la construction. Si nous avons quelque mérite à rester fidèles à nos traditions scolaires et académiques, pour mériter une place estimable à la suite des belles époques de l'architecture Française, nous comprenons en même temps que la hardiesse, l'indépendance et l'originalité sont les qualités essentielles de la vie de notre art, et nous savons que sous ce rapport votre nation n'a à recevoir de leçons d'aucune autre . . . . . Parmi les édifices importants et le plus récemment exécutés à Paris, je vous signalerai des monuments desquels vous en rencontrerez plusieurs déjà connus ; mais je les réunis ensemble parcequ'ils appartiennent à une période d'années qui ne remonte pas à plus de dix ans. C'est d'abord l'Église St. Augustin, construite au Boulevard Malesherbes par Mr. Baltard. La disposition du plan a été très-genée par des alignements imposés maladroitement, et la façade en a beaucoup souffert. L'effet intérieur du dôme est remarquable. Le style de l'architecture, qui est un peu indéterminé, a au moins le mérite de ne pas être la reproduction de celui d'une époque passée. On doit remarquer aussi un système de fonte et de pierre employé dans l'ensemble de la construction. Je ne pourrais pas me charger de défendre ce système surtout dans le cas donné. L'Église de la Trinité, construite par Mr. Ballu, est très-intéressante. Elle manque un peu de cette gravité religieuse que comporte le sujet, mais son ornementation élégante représente assez bien les habitudes et l'esprit du quartier où elle est construite. Son style est celui de la Renaissance Française ; la façon dont il a été employé dénote beaucoup de savoir et de l'habileté comme constructeur. Je cite aussi du même architecte l'Église St. Ambroise (Quartier Popincourt), qui est en style du 12<sup>ème</sup> siècle ; l'architecture en a été étudiée très-sérieusement et je trouve même que c'est un des meilleurs titres de Mr. Ballu à l'estime de ces confrères. . . . . Vous me demanderez peut-être pourquoi on a pris alternativement de nos jours pour modèles ces types d'architecture si distancés de style et d'époques, et appartenant à l'art du passé ? Je serais fort embarrassé de l'expliquer—nous obéissons ici comme partout à l'abandon d'une architecture contemporaine. Lorsqu'il s'agit d'églises nous sommes sans aucune doute sous l'influence des autorités ecclésiastiques qui ne reconnaissent l'architecture religieuse que dans les époques passées. Le clergé voudrait-il fonder une architecture sacrée, immuable dans sa forme et parallèlement aux dogmes invariables de la religion ? C'est possible, mais alors pourquoi le style du moyen-âge plutôt que celui du 12<sup>ème</sup> siècle, ou le 13<sup>ème</sup> plutôt que le 14<sup>ème</sup> siècle ou même la Renaissance. Je ne me charge pas d'expliquer ces anomalies qui témoignent au moins de la différence de manière de voir de nos ancêtres. Pour ma part j'estime surtout les époques qui écrivent avec vérité leur vie contemporaine, même en matière de religion. Pardonnez, je vous prie, cette digression qui pourrait nous mener bien loin mais qui me conduit à constater que quelques artistes se préoccupent de ces questions sérieuses. Ainsi, parmi nos églises modernes je vous recommanderai celle nouvellement construite dans le Quartier Montrouge par Mr. Vaudremer. Elle est fort simple mais elle porte dans sa composition, comme dans son ornementation, une saveur des basiliques Latines et Byzantines qui constitue un ensemble harmonieux et vraiment original et contemporain. Je citerai du même architecte la Prison de la Santé ; c'est un ensemble remarquable, de bonnes dispositions et de constructions fort bien étudiées. Je ne vous parle pas du nouvel Opéra ; c'est un sujet épuisé dont sans doute vous avez fait une appréciation sérieuse. C'est une manifestation très-expressive du règne Impérial qui vient de s'écrouler, mais c'est en même temps un monument qui aura une grande place dans l'histoire de notre art. J'ai aussi à vous indiquer les nouvelles constructions de la Bibliothèque Nationale construite par Mr. Labrousse. En outre des dispositions intérieures, qui sont je crois empruntées à votre pays, et en dehors de la Salle de Lecture qui a une physionomie remarquable, je vous recommanderai la nouvelle façade qu'on vient d'achever sur la rue de Richelieu. C'est là certainement de l'architecture et c'est digne de prendre place parmi nos plus beaux monuments. Il ne faut pas manquer de voir, parmi les bâtiments de la Bibliothèque, la Galerie Mazarin qui vient d'être restaurée ; c'est un



des plus beaux spécimens de l'époque de Louis XIII. Je ne reviendrai pas sur les travaux du Palais de Justice; quoique toujours en cours d'exécution plusieurs d'entre eux sont déjà anciens, et il a fallu l'incendie de Paris pour y créer un nouvel intérêt. Tout se restaure petit à petit et dans cinq ou six ans il n'en restera plus de traces. À côté de malheurs regrettables il y aura quelques compensations: ainsi, la ré-édification de la Grande Salle des Pas Perdus fournira un exemple d'une nouvelle construction monumentale. . . . . Un dernier mot en faveur des maisons de Paris: ici, vous le savez, nous sommes plus faciles pour admettre cette promiscuité d'habitations privées dans une grande maison commune. Moins jaloux que vous de notre liberté individuelle nous nous soumettons à l'inspection d'un portier en commun, pour jouir d'un appartement dont toutes les pièces de plain pied sont combinées pour vivre en famille et recevoir nos amis. Il en résulte que nos maisons, sans avoir les proportions imposantes des palais d'Italie, ont au moins une importance qui a bien son intérêt dans l'architecture d'un peuple. Il y a bien des obstacles à la vérité qui s'opposent à cette prétention: la monotone division des étages et les exigences du commerce qui forcent à poser tout un édifice sur une cage de verre. Malgré ces terribles conditions il faut cependant savoir gré à plusieurs architectes qui ont montré un vrai talent dans la manière de les remplir. . . . . J'ai été très-sensible à votre promesse d'un accueil bienveillant de la part de vos honorables confrères, dans le cas où j'aurais la liberté d'aller vous faire une visite à Londres. Vous ne pouvez douter de mon désir de me rencontrer avec les architectes les plus distingués de votre pays, et de revoir aussi les précieuses richesses de votre Musée incomparable. Croyez donc que, si le ciel m'accorde la santé et la liberté, j'irai vous remercier de votre courtoisie héréditaire dont il y a bien des années j'ai éprouvé les meilleurs témoignages de la part de votre illustre père.

Agréez, Monsieur et très-honoré confrère, l'assurance de mes sentiments les plus dévoués.

MONSIEUR F. P. COCKERELL.

(Signed) L. DUC.

The character of Duc's whole career may very fitly be described in the words used by the late Mr. F. P. Cockerell, in his notices\* of Duban, Léon Vaudoyer and Henri Labrouste. "In the lives of these men," said he, "I find a high ideal involving a high ambition, pursued with a singleness of aim and an untiring energy of devotion, which is quite unsullied with any taint of greed. The early ambition of these men, whether they are born to ease or to toil, is not to rush into practice and to secure commissions, but to distinguish themselves in the School, and to gain its honours and their crown—the Grand Prix. At Rome they live a life of anything but luxury, and spend five years in study without a thought of the five per cents. which are passing into the pockets of those at home. When they achieve professional success their ideal is not to multiply jobs but to carry out with conscientious perseverance some one or a very few works. When we consider the time occupied in one of the French Public Works, and learn that its author has scarcely any others simultaneously, we may judge how great is the sacrifice he makes of comfort and luxury to the attainment of perfection. These lives may indeed put us to the blush, and I cannot but feel with humiliation how great is our need of the study of them." Duc, moreover, was elected a Member of the Institut de France in 1866, when both Henri Labrouste and Léon Vaudoyer were candidates for the academic chair. A short time previously he had been promoted to the rank of officer of the Légion d'Honneur. In 1861 he joined in the great "Sketch" competition for the New Opera House in Paris, and he obtained the fourth premium, the winner of the fifth and lowest premium being M. Garnier, to whom, in the limited competition which followed, the jury unanimously awarded the execution of the work. In 1869 Duc received the "Grand Prix de l'Empereur," being a purse of 100,000 francs (£4,000), which it was then decreed should be awarded every five years to some artist who had specially distinguished himself in painting, sculpture or architecture. With two-fifths of this money, he founded, in 1872, an architectural prize at the École des Beaux-Arts, and he

\* See the TRANSACTIONS, Session 1875-76, pp. 208-222.



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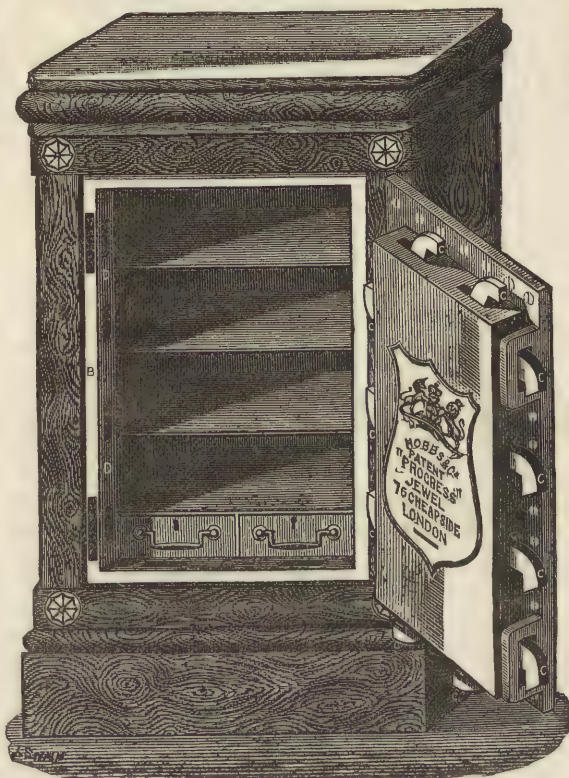
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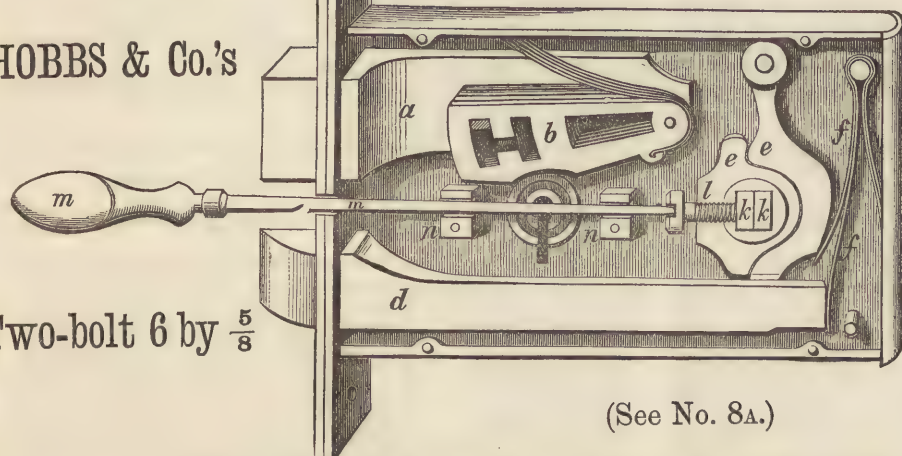
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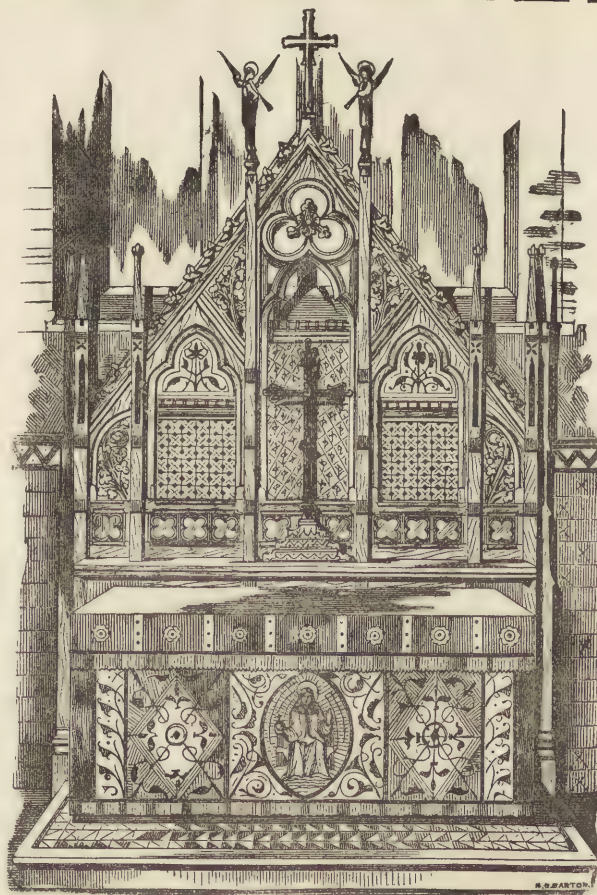
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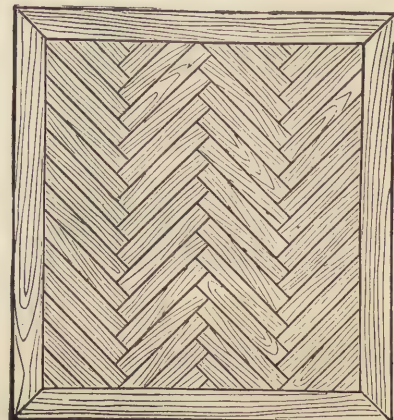
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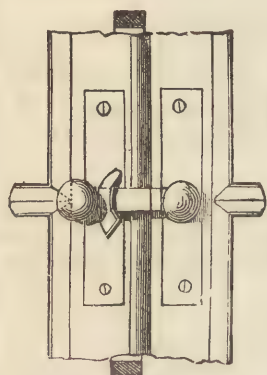
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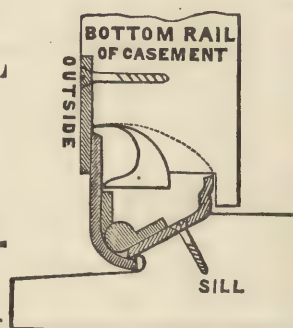


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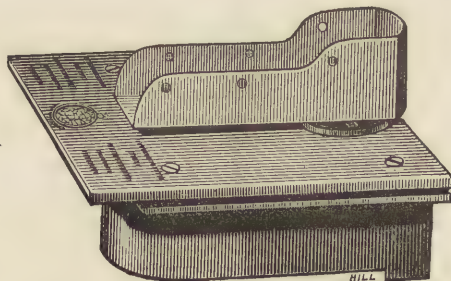
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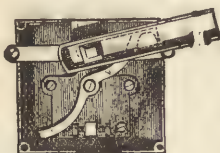
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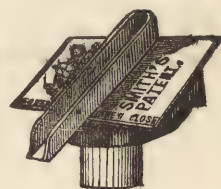
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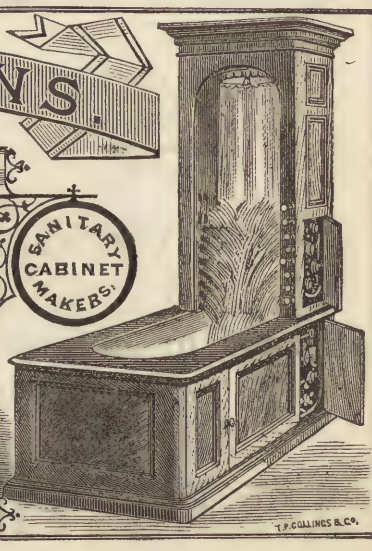
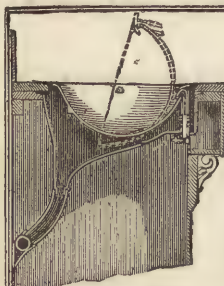
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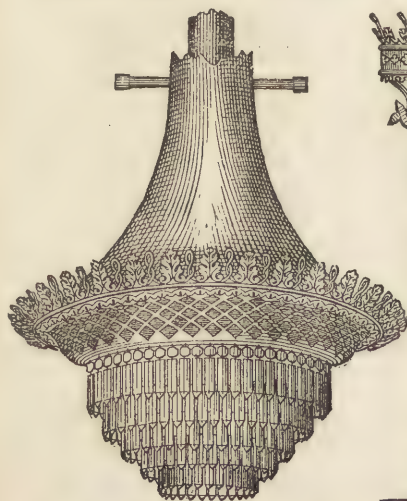
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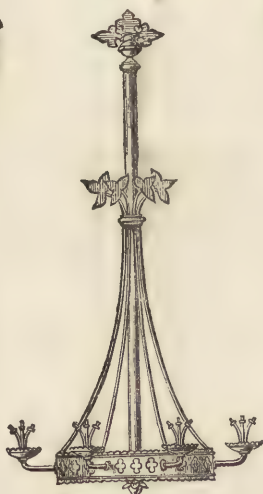
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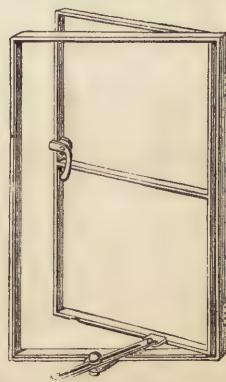
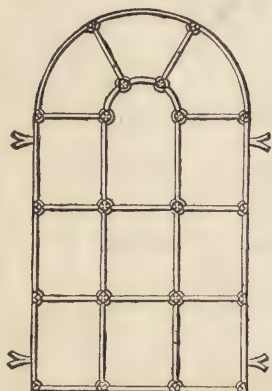
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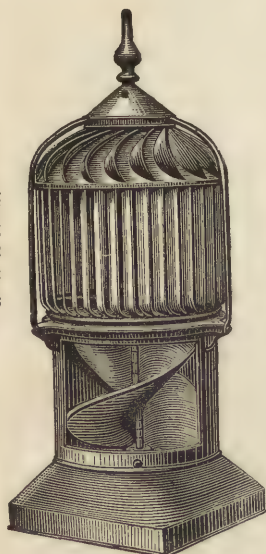
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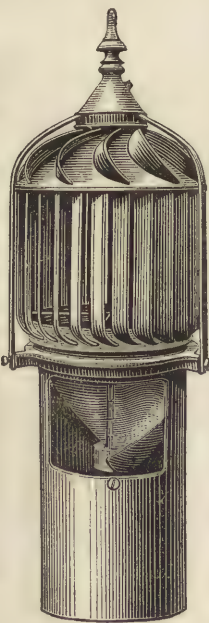
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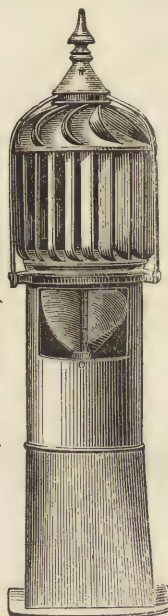
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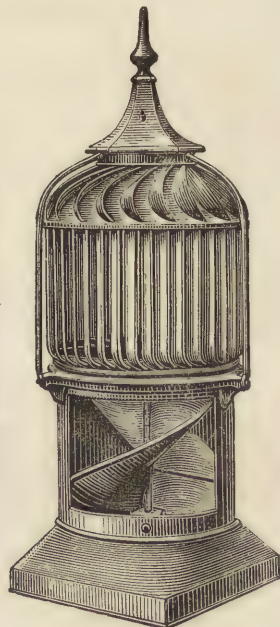
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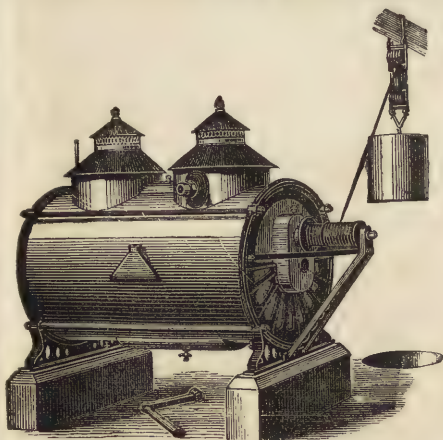
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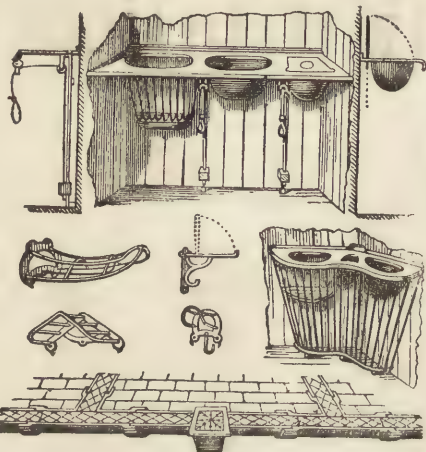
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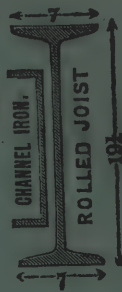


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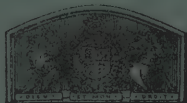
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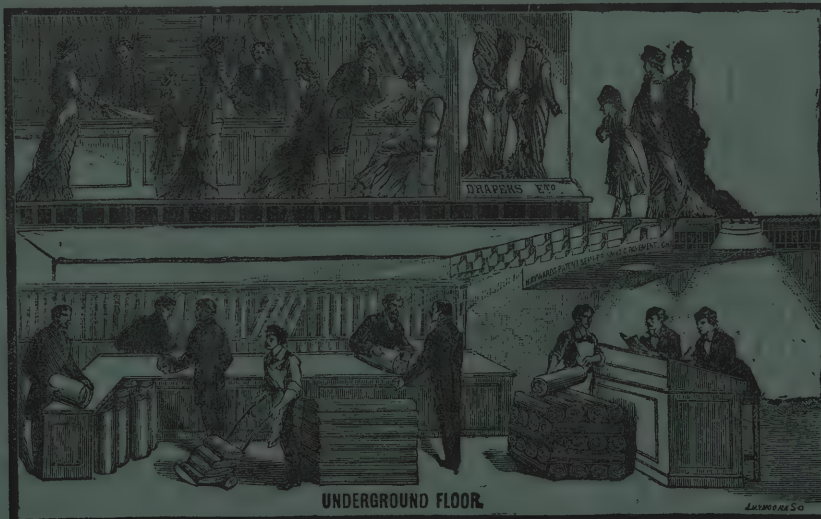
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| TITLE OF PAPER.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | AUTHOR'S NAME.                                                                                             |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------|
| I. Opening Address                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | John Whichcord, F.S.A., <i>President</i>                                                                   | Dec. 1st, 1879  |
| II. Frederick Pepys Cockerell: a Memorial Sketch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Anonymous                                                                                                  | Dec. 15th.      |
| III. Buddhist Architecture in the Jellalabad Valley                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | William Simpson, F.R.G.S., <i>Hon. Assoc.</i>                                                              | Jan. 12th, 1880 |
| IV. Architectural Competitions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Thomas Porter, <i>Fellow</i>                                                                               | Jan. 26th.      |
| „ Adjourned Discussion on ditto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Sir Ed. Beckett, Q.C., <i>Hon. Associate</i> ,<br>Professor Kerr, <i>Fellow</i> , and others.              | Feb. 9th.       |
| V. Portland Cement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Henry Faija, Assoc.M.Inst.C.E.                                                                             | Feb. 23rd.      |
| VI. The Polychromatic Decoration of various Buildings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | John Pollard Seddon, <i>Fellow</i>                                                                         | April 5th.      |
| VII. Iron as a Material for Architectural Construction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | James Allanson Picton, F.S.A.                                                                              | } April 19th.   |
| VIII. "Mild Steel" and its applications to Building                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Prof. Alex. B. W. Kennedy, M.Inst.C.E.                                                                     |                 |
| „ Discussion on Iron and "Mild Steel"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Dr. C.W. Siemens, F.R.S., <i>Hon. Assoc.</i>                                                               | April 19th.     |
| „ Adjourned Discussion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | William White, F.S.A., <i>Fellow</i> , Geo.<br>E. Street, B.A., <i>Past Vice-President</i> ,<br>and others | May 24th.       |
| IX. Presentation of the Royal Gold Medal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | John Whichcord, F.S.A., <i>President</i> .                                                                 | } June 7th.     |
| X. The Chæroneian Lion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Professor Donaldson, <i>Past-President</i> .                                                               |                 |
| Notices of Deceased Members: Edward Middleton Barry, R.A., Assoc. Inst. C.E., <i>Vice-President</i> ; Jean Pierre Cluysenaar, <i>Hon. &amp; Corr. Member</i> ; Pascal Coste, <i>Hon. &amp; Corr. Member</i> ; Joseph Louis Duc, <i>Hon. &amp; Corr. Member</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                            | Sept. 16th.     |
| Notices of Deceased Members, continued: Joseph Louis Duc, <i>Hon. &amp; Corr. Member</i> , continued; The Marquis Selvatico Pietro Estense, <i>Hon. &amp; Corr. Member</i> ; Benjamin Ferrey, F.S.A. <i>Past Vice-President</i> ; Johann Heinrich Strack, <i>Hon. &amp; Corr. Member</i> ; Eugène Emmanuel Viollet-le-Duc, <i>Hon. &amp; Corr. Member</i> ; Thomas Henry Wyatt, F.S.A., <i>Past-President &amp; Hon. Secretary</i> ; Charles James Adams, <i>Fellow</i> ; Horace Field, <i>Associate</i> ; Charles Augustus Gould, <i>Associate</i> ; John Henry Hakewill, <i>Fellow</i> ; Robert Hesketh, <i>Fellow</i> ; Thomas Kesteven Hill, <i>Fellow</i> ; Augustus Frederick Livesay, <i>Fellow</i> ; George William Mayhew, <i>Fellow</i> |                                                                                                            | Sept. 23rd.     |

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Affords Ventilation with security when the Window is opened at the top or bottom.

Its efficiency is proved by the fact that it securely fastens the sashes both when closed and when partly opened for the purposes of ventilation by automatic action, and acting by gravitation without springs, its construction is of the simplest character.

It is especially useful for those sashes where the centre bar is so high as to place the ordinary Fastener out of reach. It is fixed when used by itself at the junction of the sashes on one side and is released by means of a single line; closing the sash automatically brings the Fastener into action. If the SASH OPENER be combined with the Fastener (see illustration), as is very convenient in heavy sashes, one pair of lines for opening and another for closing are used.



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Is formed of several bands of watch-spring steel, covered with a binding of copper wire, and so prepared as to resist corrosion, supplies a want long felt of a material for hanging safely all kinds of—but more especially—heavy sashes.

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Registered NIPPERS, made entirely of cast steel, and useful for numerous household purposes, especially for opening champagne, may be had with the Line.



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Suitable for all kinds of—especially Venetian—blinds which are worked by lines. Is simple in construction and perfect in action. The blind is raised or lowered by holding the line or lines out of the vertical line, when, in consequence of the moveable roller immediately falling to the bottom of the slot, the lines become free to move up or down until released, when, falling vertically, the friction causes the moveable roller to be drawn up towards the fixed roller, and automatically clamp them.



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Are intended to replace the troublesome studs by which book or other shelves have been usually regulated. The perforated metal strips are let in and screwed to the upright frames. The plates, although sufficiently strong to support the heaviest books, are so thin as not to require to be mortised into the shelves, and by the facility with which the plates are inserted, a fine adjustment can be given to the shelves without an irritating waste of time.



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Is the ordinary fastener, with a projection on the left of the arm, forming the PATENT GUARD, which, when tug to force back the arm, the to, and immediately behind the opening between the sashes. When any instrument is thrust through the opening, the PATENT GUARD, instantaneously closing on and tightly wedging it, effectually prevents the instrument from passing.

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took great pains to make it as useful and practical as possible. Duc's care in this respect is shown in the following extract from his letter, setting forth the aim he had in view :—

“Le but de concours n'est donc pas le renouvellement de ces exercices d'où naissent tous les jours à l'École des Beaux-Arts d'ingénieuses et brillantes compositions basées sur des programmes souvent complexes. Les concurrents n'auront qu'à présenter, à leur choix, les sujets peut-être les plus simples, mais surtout *les plus propres à mettre en évidence les éléments essentiels de notre architecture, au point de vue des qualités diverses qui ont conquis notre admiration aux belles époques du passé.* . . . . .”

From officer he became “commandeur” of the Légion d'Honneur, and in 1871, when a permanent “Service d'Architecture” was established in Paris, Duc was appointed Vice-President of the Council, M. Alphand being the President. He had previously during the Empire served on the Commission des arts et édifices religieux; and on the jury of the Architectural Section at the École des Beaux-Arts. He had been also *architecte-en-chef*, having charge of the Lycées and Collèges, the Sorbonne, the Institut Eugène-Napoléon, &c. In 1876, the Royal Gold Medal was, with the sanction of the Queen, presented to Duc, whose speech on receiving it from the hands of Mr. Charles Barry, at that time President, was heard with marked attention by a crowded audience. During the period of the last International Exhibition in Paris, Duc's kind hospitality to his English colleagues was thoroughly appreciated. It was at his house that the news of Cockerell's sudden death was received, long after the appointed hour of dinner, by the guests assembled to meet their English friend and sometime comrade. Duc assisted at the funeral service in the Rue Marboeuf in November, 1878, and followed Cockerell's body to the grave at Auteuil—the last communication he made to the Institute having reference to that regretted calamity. His death occurred in January, 1879, and the Council of the Institute addressed to the Institut de France a letter of sympathy and condolence in the loss thus sustained by the architects of both countries. The continued employment for nearly forty years of one directing mind, in such a group of buildings as that of the Palais de Justice, contributed in Duc's case to foster feelings of sincere respect and affection for him among the various members of the *corps de bâtiment* who served under him. Unlike the English system, French buildings, both public and private, are executed not by one general contractor but by several contractors, each—that is, the mason, the smith, the carpenter, the joiner, the slater, the painter, the sculptor, the *ornemaniste*—being responsible only for his own portion of the work, and dependent upon the instructions and advice of the architect. Some weeks before his death Duc summoned to his bedside the heads of the principal trades employed at the Palais de Justice, in order to receive his last wishes as to the work still remaining to be done. One of them, writing to an English friend, expressed very characteristically the sentiments of his colleagues in view of their impending loss: “Je l'ai quitté,” said he, “le cœur navré et me demandant si je le reverrais; je lui dois beaucoup de ce que sais aujourd'hui, et ce sera pour moi un grand chagrin.”

THE MARQUIS SELVATICO PIETRO ESTENSE, *Hon. & Corr. Member* (Padua).

THE author of valuable works on architectural subjects, Selvatico was elected an Hon. & Corr. Member in 1850. His death, at the age of 77, occurred on the 26th February, 1880. The same day the Commune of Padua, his birthplace, issued a notice to the effect that Padua had lost one of her most illustrious sons, an ornament to Italy, who at an



advanced age had closed a life spent entirely for the glory of his country; and that the funeral would take place on the following day. A eulogy of the deceased author, from the pen of Giovanni Cittadella, was received at the Institute a few days after Selvatico's death. Portions of it translated are here reprinted:—

"I leave to more competent judges than myself the pleasing duty of setting forth in detail the many merits of Pietro Selvatico, as manifested in his numerous works on History and Criticism in the wide field of the Fine Arts, to the study of which he assiduously devoted his long and industrious life. Bound to him in the bonds of friendship from boyhood, I shall touch in these few observations upon the general characteristics of his versatile genius, to satisfy heart-felt dictates, generated by a long habitual intercourse never interrupted in the course of years, and productive to me of so much good counsel and affection. Gifted by nature with a ready intelligence, a brilliant imagination, a memory that may be called unlimited, he was indebted to his parents for a careful education and the watchful companionship of a most distinguished tutor, the illustrious Professor Lodovico Menin . . . . . While still a youth, he had become thoroughly acquainted with the Latin and Italian classics, not unfrequently astonishing his hearers by discussing the merits of such authors as come but rarely within the scope of young students. . . . . There are but few who, having dedicated themselves to the mastery of the Fine Arts, are able to identify themselves with their innermost signification as he, who endowed with literary knowledge, and profoundly cognizant of the varied life of peoples, knew how to entwine their histories with the manifestations of the brush, and, more singularly still, of the compasses. . . . . He said to me that the elements of the various styles of architecture were not merely forms but embodiments of ideas, and that the combination of their lines comprised an entire order of things, in which the lines themselves had taken origin. This is precisely the reason why he considered such elements to be so many words, which, in the mouth of one who knows how to use them, may ever be able to enunciate new ideas. Nor did Selvatico restrict his observations to the æsthetics of art only, because he wished to see it allied to science; he also aimed at perfection in mechanical engines, simplicity and solidity of construction, and in the application of forces. Hence architecture was to him the mirror of life, deriving vigour and prosperity from the just equilibrium of its members; it was to him *the art* which more especially follows the order of thought and sentiment; for this reason he shows himself to be, in many of his writings, a subtle investigator, severe critic, an unerring master, a most lucid, powerful and eloquent narrator. And, as though all this were nothing, he knew how to combine theory with practice, of which talents he gave many proofs, when—the renown of his powers having spread through Italy and beyond its borders—he complied very many times with the requests made to him from some of the most important cities of Italy, the object being, sometimes the reduction to its pristine form of some sumptuous building of antiquity, dilapidated by time, or disfigured by the caprice of man; or at other times, of erecting some new edifice—for the artists themselves had recourse to that 'amateur' whose judgment in adapting architecture to the manifold exigencies and uses of various ages they so much respected. He might be said to be an accomplished linguist for he ever had a ready answer, in every language, to any question concerning the art of construction, no matter of what time and origin. Nor was his opinion less respected in matters concerning the art of painting. He was conversant with its most remote origin, the vicissitudes which it had undergone, sometimes of progress, sometimes of regress; as a most diligent traveller and observer he had visited the principal collections in Italy and Europe, and had not only become conversant with the manner of the various heads of schools, but was also able to obtain command over the divergencies, less salient, in the manner of the more distinguished pupils of the great masters; nor was he ever tired of noting the merits and defects of every recognized artist. . . . . From the hard dry hieratic manner of early times he kept pace with art down to our own era—he sees it liberate itself from the Florentine yoke, turn to nature, and warm up into feeling; here he treats of it as regards invention, there as regards the diligent industry of design; sometimes he sees it practically pervading the very lives of the artists, assimilating itself to society, sometimes descending to the very brink, and then again ascending to those heights which can only be attained by those who know how, by keeping free of the shackles of conventionality, to carry reality to the height of the ideal, the real solemn mission of men of letters and of art. Nor does he instruct and please you less, when, leaving the magical sphere of colour, he advances towards the domain of the chisel; there also he leads you on and introduces historical and critical lore, perhaps unique in this direction, inasmuch as eminent writers on art usually dedicate their attention to one only of the sister arts, while he on the contrary bound himself by the bond of admiration to the whole inspired family, searching out and revealing its conditions with a masterly hand. How full he was of such doctrine we are taught by his lectures on Figurative Beauty (*il Bello Figurativo*) which might with good reason have been expected from his truly

pictorial pen, and which obtained for him admission to the Academy Della Crusea, and by means of which he left an everlasting record of merit in the Venetian Academy of Fine Arts, in which he spoke, wrote and worked for several years as professor and secretary, demonstrating by actual example how the fine arts may enable a vigorous intellect to dominate in the world of ideas. . . . .

"A man so entirely devoted to study as he was, occupied often in the practical exercise of art, called upon for advice and guidance far and near, might easily be supposed to be grave in manners, shy and almost downcast; but he was just the reverse. When he had not his books and drawings or his pen in hand, when in society with a few friends, he was always gay, always jovial, and so lively that the vivacity of his spirit, sometimes sparkling, gave flavour to the joke and diffused good humour. An enemy to ceremony he cultivated urbanity of manners, the secret entrusted to him he jealously kept, his few friendships he faithfully maintained, the tasks imposed upon him he fulfilled with almost feverish anxiety; he knew and practised the finest delicacy in regard to honesty even to his own prejudice; he looked to his personal interest as a means not an end; he suffered two years of blindness, resigned and industrious in expedients not to interrupt his labours, which he afterwards resumed with juvenile alacrity, and the first day on which his sight returned he informed me of the fact in some moving lines which are among the most pleasing records that I preserve of him."

Selvatico's works included a large number of Papers on Art and Artists, on subjects such as the arts of design in Italy critically and historically considered, the free teaching of them in Academies and Institutes, and other cognate matters. He also criticized the education of the modern Italian historical painter. His work on Architecture and Sculpture in Venice, an octavo volume\* fully illustrated, was presented by himself to the Library, which also contains his Paper\* on the Arena Chapel (containing Giotto's frescoes) at Padua. Selvatico in earlier years, sent several communications to the Institute.

#### BENJAMIN FERREY, F.S.A., *Past Vice-President.*

BORN seventy years ago at Christchurch in Hampshire, Ferrey belonged to a family whose Huguenot ancestors migrated from France to England at the time of the revocation of the Edict of Nantes by Louis XIV. He was educated at the Grammar School at Wimborne in Dorsetshire, and was afterwards placed with Augustus Pugin, who at that time was in the habit of making long tours in England and the North West of France for the purpose of measuring and drawing mediæval buildings. In those tours Pugin was generally accompanied by some of his pupils, whom he taught to assist him in his labours, and some of whom afterwards distinguished themselves. Besides Ferrey, the late Talbot Bury, *Past Vice-President*, and the late Sir James Pennethorne, *Fellow*, Pugin's pupils included the late E. W. Cooke, R.A., *Hon. Associate*; the late Joseph Nash, painter; the late Charles Mathews, actor; F. T. Dollman, *Associate*; and Mr. R. B. Grantham, M. Inst. C.E.,—the two last-named being still engaged in the exercise of their respective professions. While a pupil, Ferrey made a large number of drawings, some of which bearing his name were published in the works then being brought out by Pugin; and after spending some years in this way he was engaged by Wilkins to assist upon drawings for the National Gallery in course of erection in Trafalgar Square. He commenced practice on his own account in 1834, and that year published plans, &c. of the Priory of Christ Church, Hants. He was one of the original members of the Architectural Society, but

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\* *Architettura e scultura in Venezia dal medio evo sino ai nostri giorni*, 8o. Venice, 1847; and *Sulla cappellina degli Scrovegni nell' Arena di Padova*, 8o. Padua, 1826.



joined the Institute as a Fellow in 1839, three years before the complete absorption of that Society. He served several times on the Council, having been first elected a Member of Council in 1850. He was first elected a Vice-President in 1854, and in 1877, when the Council were reconstituted, he again became Vice-President. He would have been nominated in due course to the Presidential Chair, had he not, in consequence of failing health, resigned in 1878. Two years afterwards, on the 22nd August, 1880, he died, after a lingering illness, and was buried at Highgate Cemetery, the funeral being of a strictly private character, in accordance with the wish of his family.

Benjamin Ferrey was employed in 1842 in the restoration of the nave, transepts and the Lady-Chapel of Wells Cathedral; and from 1870 to 1874 he restored the West front and towers.\* He made considerable additions to the Bishop's Palace at Wells, and restored the Chapel attached to that building. He also held the honorary appointment of Diocesan Architect for Bath and Wells. He restored the North transept of Romsey Abbey, and in conjunction with the late Sir Gilbert Scott he rebuilt the tower of St. Mary's, Taunton. More than fifty other churches in different parts of England and Wales have been restored by him, and nearly sixty new churches erected from his designs. He designed and carried out a large number of hospitals, schools, almshouses and parsonages. He was the architect of the mansion erected in 1877 (his last work) at Bagshot Park for H.R.H. the Duke of Connaught; of Wynnstay, for Sir Watkin Williams Wynn; of Bulstrode, for the Duke of Somerset; and of many other large country houses. He also altered and enlarged Luton Hoo for the Marquis of Bute; Brogyntyn, in Shropshire, for Lord Harlech; Killaleagh Castle and several other buildings on the Earl of Dufferin's estate; Cefa Park, North Wales, for Sir Roger Palmer; Brandon Lodge, for Lady Beresford; Knowle, in Surrey, for Sir William Hanham; Frampton Court, Dorchester, for Mr. R. B. Sheridan, M.P.; a mansion for Lord Poltimore, and a host of other works in different parts of the country. He was one of the Consulting Architects to the Incorporated Society for the building of Churches, and he was employed by Miss (now the Baroness) Burdett Coutts to design the Church of St. Stephen, in Rochester Row, Westminster, as well as Schools and the Vicarage, all of which were erected from the years 1845 to 1847. Ferrey's book† on Augustus Welby Northmore Pugin and his father Augustus Pugin was very favourably criticized, and it appeared in 1861. Two years afterwards he became a Fellow of the Society of Antiquaries. In 1870 he prepared designs for a new Cathedral to be erected at Victoria, in British Columbia, a work which has not yet been commenced; and the same year he received

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\* See "Observations" on this work by Ferrey in the *TRANSACTIONS*, Session 1870-71, pp. 17-30. He also contributed practical Papers, notably, in June 1857, a valuable communication on stamped or incised stucco; another relative to the process described by J. Sylvester to render bricks and stone impervious to moisture; and an account of a curious double spiral staircase in the Church of St. Editha, Tamworth, the two last-named in 1843.

† *Recollections of A. W. N. Pugin and his father Augustus Pugin, with notices of their works*, 8o. Lond. 1861. It has been said that Ferrey's "Recollections" of Pugin ought to be in every architect's library, and the fact that the names of father and son are often confounded at the present day shows that this very readable book is not much read. The elder Pugin was born in France in 1762 of a good French family and fled to England at the time of the French Revolution. A total stranger, almost ignorant of the English language, he was engaged as a draughtsman by the celebrated Nash, who had advertized for the services of a French assistant. He afterwards married an English lady and became the intimate friend of many Englishmen who are now justly remembered. Both his son, A. W. N. Pugin, and his grandson, E. W. Pugin, are dead.

the Royal Gold Medal. The late Sir William Tite, who was then President, alluded to Ferrey's career in the following terms :—

I believe that he and I began life about the same time, and that was a good while ago; he tells me that he was a pupil, not of the elder Pugin, but of the eldest Pugin, for there have been three of that name in my day and generation. I recollect perfectly well this Mr. Pugin, when I was a very young man in the office of Mr. Laing, architect to the Custom House, whose pupil I was. Mr. Pugin came to the Custom House, then in course of erection, to make some drawings, for he was one of the ablest draughtsmen of the day. Mr. Pugin, besides being distinguished as a draughtsman, was one of the earliest pioneers of the study of Gothic architecture. I dare say you all know the book by Pugin and Mackenzie—though you cannot recollect its publication as I do. The illustrations of that work were, I believe, to a great extent etched\* by Mr. Pugin himself, and it was one of the great precursors of architectural literature, for I think it was published almost as early or earlier than Britton's great works of that day. It introduced a taste for Gothic architecture; and in that book were engraved some of the most agreeable and, so far as I recollect, some of the finest specimens of that architecture. . . . I have the pleasure to notice that, like Mr. Pugin, he (Mr. Ferrey) has the advantage of having a very skilful son, who has won some of our prizes, and will possibly win many more, and I am delighted to think that a worthy father is likely to be followed by an equally worthy son.†

In a recent notice of Benjamin Ferrey, published in the *Builder*, he is described as one of the best draughtsmen of his day—one who “was equally skilful at landscape, and who, in water-colours, could use his brush with much skill. In his holidays he was wont to delight in the latter as a relaxation after his architectural work. He was also extremely fond of music, particularly church music, and had a pleasing baritone voice. With his pleasant countenance and winning manners he gained many clients, and in most cases his clients became afterwards his personal friends.”

#### JOHANN HEINRICH STRACK, *Hon. & Corr. Member* (Berlin).

THIS distinguished architect, whose death occurred on the 13th June, 1880, was born on the 24th July, 1805, at Bückeburg in Holstein, where his father was Court Painter and Professor. He was educated at the local “Gymnasium,” and in his 19th year entered the Architectural Academy at Berlin, as a student. He was employed in Schinkel's office for several years, during which he prepared designs for the apartments of the then Crown Prince, afterwards Frederick-William IV., in the new Palace at Berlin; in 1828 he superintended, under Schinkel, the erection of the Palace of Prince Carl and the Palace of Prince Albrecht. In 1834 he joined Ed. Meyerheim, the painter, in a tour through the province of Brandenburg for the purpose of measuring and drawing the more important mediæval monuments in that part of Germany, afterwards published in their joint names under the title of *Architectonische Denkmäler der Alt-Mark Brandenburg*. In 1837 he gained in a public competition, in conjunction with his friend Stüler, the first premium for the stations on the first Russian railway, namely, that from St. Petersburg to Paulowsk, and he superintended their erection. On his return to Berlin, Strack and Stüler published *Vorlege blätter für Tischler*—working drawings for joiners, chiefly in German 15th Century Gothic; and during this period

\* Pugin allowed the names of his pupils to appear on the illustrations drawn by them. In Pugin's *Ornamental Bargeboards* and the *Gothic Ornaments* a large proportion of the illustrations have “Benj. Ferrey, delt.,” engraved in one corner.

† See the TRANSACTIONS, Session 1869-70, p. 145.



he erected a number of private dwellings in and about Berlin. In 1838 he was admitted Royal "Baumeister." As early as 1827 he had lectured and taught at the Institute of Architects in Berlin, and he afterwards devoted several years to teaching at the Royal College of Artillery and Engineering, at the Academy of Arts and the Architectural Academy. In 1843 he published a work on the theatres of Ancient Greece;\* and about this time, again with his friend Stüler, he visited France and England, when he was admitted a Foreign Associate of the Institut de France, and an Hon. & Corr. Member of the Institute. He completed the Palace of Babelsberg near Potsdam, as well as the present Imperial Palace. In 1862 he spent several months at Athens, and whilst engaged in exploring the southern slopes of the Acropolis he discovered the remains of the Theatre of Dionysius, which he described in the *Zeitschrift für Bauwesen* of that year. His best known public works are the Palais Raczynski (1843), the Churches of St. Peter (1846-50) and St. Andrew (1853-56), the National Gallery (1866-76), the Arcades flanking the Brandenburg Gate (1868), the Column of Victory in the Thiergarten (1871-75), and the Villa Borsig—all in Berlin; the Casino at Cologne; the Castle of Fredriksborg near Copenhagen; a Mansion at Altona; and the Monuments of Borsig and Blücher. He was a foreign Member of the Academies of Amsterdam, Rome and Madrid, and at the time of his death Professor Strack held the post of Architect to the German Emperor.

EUGÈNE EMMANUEL VIOLLET-LE-DUC, *Hon & Corr. Member* (Paris).

THE author of the *Dictionnaire raisonné de l'architecture Française du XI<sup>e</sup> au XVI<sup>e</sup> siècle*† and of the *Dictionnaire raisonné du Mobilier Français de l'époque Carlovingienne à la Renaissance* was born in Paris in 1814, and died at Lausanne on the 18th of September, 1879. His early education was acquired in a private school at Fontenay-sous-Roses, a suburb of Paris, and at the Collège Bourbon. His father held the post of Conservateur des Bâtiments Royaux, and in virtue of that office had apartments at the Tuileries. A literary man of much refinement, the society he kept included Prosper Mérimée, Sainte-Beuve and other critics of a like literary distinction. Such surroundings undoubtedly had their influence over the young Viollet-le-Duc, who at twenty years of age, it is said, had travelled on foot through many parts of France, sketching bits of churches, cathedrals and castles—then despised by some as works of the Middle Ages, or ignored by others who saw in the archæological excellence of Grecian and Roman remains the only models for modern architecture. References are made by himself to his early career in the preface to the Dictionary of Architecture and also in Letters written from Germany in 1854. He declares that in his youth there were no books‡ which could point out to him the road to take, and that, at that

\* *Das Altgriechische theatergebäude*, fo. Potsdam; 1843. In the Library.

† The *édition de luxe (grand papier)* of this Dictionary was presented by the author to the Library.

‡ See the *Lettres adressées d'Allemagne à M. Adolphe Lance, architecte*, 8o. Paris 1856, in which, at p. 69, he says: "il y a vingt ans nous n'avions en France qu'un seul ouvrage d'architecture sur nos monuments de la Normandie, le volume de Pugin." This was written in September, 1854, and he had visited England before then.

time, a great many masters in architecture barely admitted the existence of those mediæval monuments which cover the soil of Europe and of France above all. He began to study architecture at 15 years of age, and at 22 went to Rome, where he resided during the greater part of his two years' stay in Italy. On his return to France he was more than ever struck with the appearance of his native buildings, with the wisdom and science which had presided over their execution, and with the unity, harmony and method of their construction. "Déjà cependant," to quote his words, "des esprits distingués avaient ouvert la voie ; éclairés par les travaux et l'admiration de nos voisins les Anglais, ils songeaient à classer les édifices par styles et par époques. . . . Les premiers travaux de M. de Caumont faisaient ressortir des caractères bien tranchés entre les différentes époques de l'architecture française du Nord. En 1831, M. Vitet adressait au ministre de l'intérieur un rapport sur les monuments des départements de l'Oise, de l'Aisne, du Nord, de la Marne et du Pas-de-Calais, dans lequel l'élégant écrivain signalait à l'attention du gouvernement des trésors inconnus, bien qu'ils fussent à nos portes. Plus tard, M. Mérimée poursuivait les recherches si heureusement commencées par M. Vitet, et, parcourant toutes les anciennes provinces de France, sauvait de la ruine quantité d'édifices que personne alors ne songeait à regarder, et qui font aujourd'hui la richesse et l'orgueil des villes qui les possèdent. M. Didron expliquait les poèmes sculptés et peints qui couvrent nos cathédrales et poursuivait à outrance le vandalisme partout où il voulait tenter quelque œuvre de destruction. Mais il faut le dire à notre honte, les artistes restaient en arrière, les architectes couraient en Italie ne commençant à ouvrir les yeux qu'à Gênes ou Florence ; ils revenaient leurs portefeuilles remplis d'études faites sans critique et sans ordre, et se mettaient à l'œuvre sans avoir mis les pieds dans un monument de leur pays." His programme, set forth in the preface to his *Entretiens*, was equally clear. "C'est dans ce sens," said he, "que j'entends écrire sur l'architecture : en cherchant la raison de toute forme, car toute forme a sa raison ; en indiquant les origines des principes divers et leurs conséquences logiques ; en analysant les productions les plus complètes de ces principes et les montrant ainsi avec leurs qualités et leurs défauts ; en faisant ressortir les applications que nous pouvons faire aujourd'hui des arts anciens, car les arts ne meurent pas, leurs principes restent vrais à travers les siècles." His study of Gothic buildings was pursued with unswerving faith and untiring energy. In 1840, when twenty-six years of age, he became an assistant to Duban, who was then engaged on the restoration of the Sainte-Chapelle. At the age of thirty-one he obtained, by competition and in conjunction with Lassus, his appointment to the fabric of Notre Dame, and on the death of Lassus the restoration of that cathedral remained under his direction. The "Service des édifices diocésains" was re-organized by Imperial decree in 1853 ; as one of the Inspectors-General his periodical visits to different parts of France gave him opportunities for revizing and comparing the mass of notes, written and graphic, which he had collected. The cathedrals of Amiens, Rheims, Paris and St. Denis, the churches of the Madeleine at Vezelay, of St. Sernin at Toulouse, and other ecclesiastical edifices too numerous to mention, were restored under his immediate direction. A member of the Commission des Monuments Historiques, the principal mediæval buildings of that class fell for a long time to his share ; with the exception of the Château de Pierrefonds, which he may be said to have rebuilt, the Cité de Carcassonne is perhaps the most complete restoration ever attempted of a mediæval fortress. At St. Denis a new church was erected from his designs, and new buildings, large and small, have been carried



out by him in other parts of France. His house in the Rue Condorcet, designed by himself on the principle of the *maison-à-loyer*, was built at his own cost; and he was the architect of other houses of the same kind erected in Paris.

The first volume of his Dictionary of Architecture was completed in 1854, the year in which his letters from Germany first appeared in the *Encyclopédie d'Architecture*—letters in which he more than once referred to the day “où nos villes françaises ne se composeront plus que de longues rues droites bordées de maisons pareilles, bien grattées et étiquetées”—bursting out immediately afterwards with “cependant, nous n'étions pas nés en France pour être livrés à cette loi des sots et des impuissants, la symétrie!” One of these letters contained an amusing description of Munich. “Le roi Louis,” he wrote, “est le Périclès de la Bavière; malheureusement les Ictinus et les Phidias lui ont par trop fait défaut.” His first impressions of the city are here given:—

“Nous sommes arrivés à Munich la nuit, par un beau clair de lune; nous avons voulu voir la ville neuve avant de souper. Rien n'est plus majestueux à cette heure que la grande rue, entièrement élevée par le roi Louis . . . . . Figurez-vous les palais de Florence, de Rome, de Milan alignés sur une voie large comme la rue de la Paix et longue d'une demi-lieue. . . . . Mais dans quel trésor inépuisable, me demandais-je, le roi de Bavière a-t-il trouvé les sommes nécessaires pour élever, en quelques années, ces immenses monuments qui, sans interruption, couvrent une partie de la ville de Munich? . . . . . La lune projetait de grandes ombres noires sur les soubassements robustes, sous les corniches saillantes. J'étais émerveillé, abasourdi.—‘Prenez garde, me dit notre ami B., ne passez pas si près de ce bâtiment.’—‘Et pourquoi?’ demandai-je surpris.—‘C'est qu'il tombe parfois de ces corniches si hardies que vous voyez là-haut des platras de plusieurs mètres de longueur; ne vous y fiez pas, elles sont en lattes recouvertes d'enduits.’ . . . . . ‘Tenez,’ ajouta mon ami, en portant la main sur un bandeau de soubassement orné d'une *poste*, et en m'en mettant sur les bras un morceau d'une longueur respectable, ‘Voici un échantillon des palais de Munich. Allons souper.’”

In another of the letters written about the same time from Prague Viollet-le-Duc referred to his impressions of Rome eighteen years before:—

“Arrivant dans la ville éternelle, l'esprit plein de tout ce que l'on dit sur les monuments dont elle est couverte, nous crûmes les premiers jours à une mystification: les palais nous semblaient assez maussades, insignifiants; les églises, ou de misérables baraques en brique et sapin mal bâties, ou des amas de formes d'architecture les plus monstrueuses; les ruines antiques—la plupart d'une mauvaise époque, des édifices cent fois remaniés et ayant perdu leur caractère. Mais ce premier examen terminé, et, dans le calme profond dont on jouit si pleinement au milieu de la vaste cité aux trois quarts déserte, quelques monuments, quelques peintures revenaient dans la mémoire, en y laissant chaque jour des traces plus profondes; bientôt ils formaient comme des points lumineux dont les reflets jetaient la clarté jusque sur les objets, les plus médiocres en apparence. Après une année de séjour, nous étions arrivé, comme tant d'autres avant nous, à vénérer les plus humbles pierres de la grande cité, à les considérer avec amour, à trouver à toute chose un parfum d'art, une poésie enfin que nul autre ville ne possède.”

Towards the close of 1861 he was urgently solicited to open an *atelier*, such as Parisian architects of eminence are in the habit of conducting. He prepared at the same time a course of lectures, and attempted to deliver one if not two. But to translate his words, “Noise is inimical to study; I love study, I detest noise. I let the storm pass, and finding nothing to overturn, it expended uselessly its lost thunderbolts. I put away the text of my course in a portfolio and thought of other things. At the present moment I very willingly leave the chair to those who occupy it with talents to which I do not pretend to attain and with authority incontestable.” He thereupon prepared for press the lectures he would have delivered orally, and in 1863 completed his first volume, the greater part of which is a critical review of Grecian and Roman architecture, and the modes of procedure adopted by the ancient constructors. The second and

final volume, which was not completed until nearly ten years afterwards, treated almost exclusively of matters of actual practice, and of the plan, construction and design of modern buildings. The second lecture is a most characteristic one; it treats partly of the various phases or supposed phases of thought and reasoning by which the Greek architect ultimately attained perfection in the Parthenon. The following extracts\* serve to give a faint idea of Viollet-le-Duc's mode of argument and description:—

“Voyons donc le temple grec. D'abord quel est le programme? Il s'agit de bâtir une *cella*, une salle fermée, de l'entourer de portiques autant pour la protéger que pour se mettre à couvert. Rien n'est plus simple. Quatre murailles percées de portes; à l'entour, des points d'appui portant des plate-bandes, protégées elles-mêmes par une corniche saillante; sur le tout, des pentes pour faire écouler les eaux pluviales des deux côtés dépourvus d'entrées. La raison seule trace ce programme. Quels sont les moyens d'exécution? L'architecte cherche une carrière voisine. . . . La carrière trouvée, l'architecte ne possède pas les engins puissants que la mécanique nous a rendus familiers, il dispose seulement des bras de ses esclaves. . . . Cependant les traditions, l'art qu'il connaît, celui qui vient de l'Égypte et d'Orient, exige précisément l'emploi de matériaux d'une dimension considérable; il n'admet que le point d'appui vertical et la plate-bande . . . . . L'architecte grec pense avec raison que la *cella* de son temple peut être élevée en matériaux de petites dimensions; ce n'est qu'un mur ayant deux parements visibles, l'un à l'intérieur du temple, l'autre à l'extérieur. Deux parements, deux pierres; construire un mur d'une épaisseur ordinaire au moyen de matériaux ne formant pas toute son épaisseur, mais composé de carreaux parementés sur une de leurs faces, comme deux dalles épaisses juxtaposées, c'est mal raisonner pour un constructeur, c'est bien raisonner pour un logicien; or, le grec est éminemment logicien: il fait donc façonner à la carrière des carreaux, c'est à dire des pierres n'ayant chacune qu'un seul parement visible. C'est avec ces carreaux qu'il élèvera sa *cella*. Cependant il reconnaît que ces deux parements forment deux murs déliaisonnés; de distance en distance, afin de les relier, il place des boutisses, c'est-à-dire des pierres longues formant parpaings. Il lui faut des points d'appui verticaux, des colonnes; il comprend que ces piles isolées, pour présenter une parfaite stabilité, doivent être composées de blocs aussi grands que possible. Les carrières et les moyens de transport dont il dispose ne lui permettent que rarement d'élever des piles monolithes. Dans la carrière, il choisit les bancs les plus épais, près d'un escarpement, là où commence le gisement calcaire; il trace sur le lit supérieur de ces bancs un cercle d'après le diamètre qu'il croit devoir donner à sa colonne; il fait creuser tout autour une fosse assez large pour que le tailleur de pierre s'y puisse tenir; il dégage ainsi en plein roc un cylindre. Arrivé au lit inférieur du banc, déblayant complètement l'excavation du côté de l'escarpement, il fait *faire quartier* à son cylindre, c'est-à-dire qu'il le couche sur le côté, puis le fait rouler comme un disque épais, en bas de l'escarpement. Là, il perce un trou carré au centre de chacune des surfaces circulaires du disque, il adapte dans ces trous deux pivots; puis, au moyen d'un châssis et de câbles, il roule ainsi les tambours de colonnes jusqu'au temple. . . . . Les plate-bandes qui porteront d'une colonne à l'autre, si le temple est d'une grande dimension, auront nécessairement un cube considérable. L'architecte grec procédera pour l'extraction de ces blocs comme il a procédé lorsqu'il s'est agi de bâtir les murs de la *cella*; il les composera de deux pierres longues juxtaposées, laissant un joint entre elles deux, l'une faisant parement à l'extérieur du portique, l'autre à l'intérieur. En effet, toutes les pierres calcaires, le marbre compris, sont sujettes à avoir des *fiels*, c'est-à-dire des ruptures de banc, invisibles au moment de l'extraction, qui à la longue se déclarent sous la charge des constructions supérieures et occasionnent une brisure irrémédiable dans une plate-bande: or, deux plate-bandes juxtaposées ont deux chances en faveur de la résistance au lieu d'une, car si l'une est défectueuse, l'autre, sa jumelle, peut résister et prévenir ainsi une chute immédiate. . . . . Le mur de la *cella* construit, les colonnes dressées, l'architecte observe que les blocs horizontaux, les plate-bandes qui doivent porter d'une colonne à l'autre, peuvent à cause de leur longueur, se briser sous la charge; sur le sommet des colonnes, il pose des blocs saillants, des chapiteaux.

“Le tailloir du chapiteau dorique grec est carré; deux de ses faces, par leur forte saillie, soulagent d'autant la portée de l'architrave; mais les deux autres, celle extérieure et celle intérieure, ne portent rien. Si donc le chapiteau dorique grec était l'imitation d'un chapeau de bois, ces deux saillies intérieure et extérieure, débordant le nu du poitrail, n'auraient aucune raison d'être. Au contraire, ces saillies sont parfaitement justifiées par la construction de pierre. . . . . Les saillies intérieure et extérieure du chapiteau étaient alors d'une

\* See *Entretiens sur l'Architecture*, Vol. I., pp. 43-53. An English translation, by Mr. Benj. Bucknall, architect, has been published.



grande utilité ; elles permettaient de déposer de longs plats-bords en dedans et en dehors, qui maintenaient la rangée des colonnes, les rendaient solidaires ; elles permettaient encore aux ouvriers poseurs de se tenir des deux côtés des plate-bandes, sans autre échafaudage, de guider les blocs et les asseoir doucement sur les chapiteaux sans qu'il pût y avoir d'erreur, puisque ces deux plats-bords laissaient juste entre eux la place de ces plate-bandes. . . . .

"Voilà les perfectionnements dans lesquels le raisonnement seul de l'homme est intervenu. Il semblerait qu'il doit être satisfait. Point. L'art intervient à son tour : ce monument est élevé sous un ciel pur à travers lequel un soleil éclatant projette sa lumière pendant dix mois de l'année. L'artiste observe bientôt que les piles cylindriques de son temple paraissent plus grosses à leur sommet qu'à la base par suite d'une illusion d'optique ; sa raison s'en choque aussi bien que son œil ; de ces cylindres il en fait des cônes tronqués. Le besoin de stabilité lui avait déjà, peut-être, imposé cette diminution des fûts. Il observe encore que les blocs intermédiaires, les chapiteaux portant la plate-bande, semblent écraser les colonnes de leur masse ; il leur laisse leur forme carrée dans la partie supérieure, la où elle satisfait à un besoin de solidité, et les taille pardessus de manière à passer du fût de la colonne au tailloir carré par une courbe. L'artiste cependant n'est pas encore satisfait, les colonnes paraissent plates en face de la lumière, molles et indécises dans l'ombre ; il recoupe longitudinalement dans la hauteur de leur fût des pans droits, puis bientôt il creuse ces pans et forme ainsi des cannelures assez profondes pour accrocher la lumière oblique sur les arêtes, pas assez pour que ces arêtes puissent offrir un obstacle et blesser les gens qui passent le long des colonnes. La lumière du soleil, en répétant ainsi sur chacun de ces fûts une série de lumières et d'ombres longitudinales, leur rend l'importance qu'ils perdaient lorsqu'ils n'étaient que coniques. . . . .

"Revenons à la structure du temple grec. L'architecte grec admet la symétrie : c'est un instinct de l'esprit humain ; mais il n'admet pas que cet instinct doive l'emporter sur la raison. En bâtissant son temple, il a d'abord commencé par faire de la cella, de l'enceinte réservée à la divinité, une construction indépendante, une clôture de pierre assez mince d'ailleurs, autour de laquelle il a planté les colonnes de son portique, en laissant entre cette enceinte et les colonnes une circulation large, relativement à la dimension de la cella. Il s'inquiète peu de faire correspondre les axes des piliers d'angles de la cella, des *antes*, avec les axes des colonnes du portique. Il a reconnu qu'en exécution ces rapports d'axes ne peuvent être compris. Sa seule préoccupation est de faire que les dispositions soient telles que le plafond en bois du portique puisse reposer sur le mur de la cella et sur les frises intérieures du portique. C'est là son seul guide. Sa raison le porte à s'affranchir plus nettement encore de ce qu'on appelle les lois de la symétrie ; les angles de son portique le préoccupent : il voit sur ces points des colonnes isolées qui doivent porter une charge plus lourde que les autres, il se défie de la force des architraves ; il prévoit que si une des plate-bandes portant sur cet angle vient à se briser, elle chassera, par suite de sa rupture, la colonne angulaire en dehors. La raison lui indique qu'il est prudent de donner aux entre-colonnements qui séparent la colonne d'angle de ses deux voisines une largeur moindre qu'au autres entre-colonnements du portique, d'augmenter le diamètre de cette colonne angulaire, et ce que sa raison lui indique, il le suit, en dépit des lois de la symétrie. Cette différence entre les axes des colonnes lui permet de placer un triglyphe à l'angle de la frise (ce qui est également conforme à la raison, puisque le triglyphe est un point d'appui, et que si un point d'appui est nécessaire, c'est surtout à l'angle d'une construction), sans pour cela augmenter d'une manière sensible les intervalles entre les trois derniers triglyphes. Ces difficultés d'ensemble résolues, l'architecte en vient aux observations de détail ; il a remarqué que, quand il pleut, l'eau bave sur la face verticale de la corniche extérieure et que, réunie à la poussière, elle y laisse des tâches brunes qui obscurcissent le couronnement de son édifice, dont il voudrait voir la saillie extrême se détacher brillante sur l'azur du ciel. Il pose sur cette corniche un canal en marbre ou en terre cuite, il le munit de gargouilles saillantes de distance en distance, et parvient ainsi à éloigner les eaux de la face de la corniche. Mais ce canal lui-même exposé à la pluie se tâche facilement ; il le couvre de sculptures ou de peintures pour dissimuler ce défaut."

Viollet-le-Duc had been an Hon. & Corr. Member since 1856 ; and the illustrations with which his literary works are crowded had rendered his name and pencil more familiar to the professional eye in England than was even then the case in France. It has been more than once said, and with some authority, that the earlier volumes of his Dictionary were published at a loss, and that the work would probably have been discontinued had the publisher not taken heart from the increasing demand for it in Germany and England. In 1864 the Royal Gold Medal was offered to Viollet-le-Duc, but with characteristic avoidance

of honours he did not cross the Channel to receive it. The following letter, accepting the offer of the Royal Medal, has been preserved :—

Paris, 15 Mars, 1864.

MONSIEUR ET CHER CONFRÈRE,—J'ai reçu la lettre par laquelle vous voulez bien m'annoncer que l'Institut Royal des Architectes Britanniques vient, à l'unanimité, de m'accorder la médaille royale, sous l'approbation de S. M. la Reine, pour services rendus comme architecte, soit par mes travaux de restauration, soit par mes ouvrages.

Aucune distinction ne pouvait m'être plus flatteuse et je m'empresserais d'aller moi-même remercier mes honorables confrères de la g<sup>de</sup> Bretagne, si je n'étais obligé de me rendre très-prochainement en Corse et en Algérie, et si je n'étais surchargé d'affaires qui ne me laissent, malheureusement, aucun loisir.

Veillez être, Monsieur et cher confrère, l'interprète de tous mes sentiments de profonde gratitude envers Messieurs les Membres de l'Institut Royal, et me croire, avec la considération la plus distinguée,

Votre bien dévoué serviteur,

(Signed) E. VIOLLET-LE-DUC.

6, rue Laval Prolongée.

MONSIEUR CH. C. NELSON.

P.S.—Ne me donnez pas le titre de membre de l'Institut Impérial de France, je ne fais pas partie de cet illustre corps.

Some five years afterwards, in 1869, about the time when Joseph Louis Duc received the "Grand Prix de l'Empereur" of 100,000 francs, Viollet-le-Duc was promoted to the rank of "Commandeur" of the Légion d'Honneur. Forthwith, his friends—colleagues and pupils—proposed to give a banquet in his honour. The Council of the Institute, hearing of this intention, made an attempt to participate in the compliment thus offered to him. Professor Donaldson wrote on the 18th October, 1869, to the late M. Eugène Millet, begging on the part of the British Architects that an expression of the most cordial sympathy and concurrence with the object of the réunion might be conveyed to all those who met to do honour to the genius of their great colleague, Viollet-le-Duc. That letter called forth the following reply :—

Paris, ce 22 Octobre, 1869.—13, Rue Treilhard, près l'église S. Augustin.

MONSIEUR,—J'ai l'honneur de vous accuser réception de la lettre que vous avez bien voulu m'adresser pour me charger d'être l'interprète du "Royal Institute" au Banquet qui doit être offert à M. Viollet-le-Duc par ses confrères et amis à l'occasion de sa promotion au grade de Commandeur dans l'ordre de la Légion d'Honneur. Je vous suis obligé d'avoir bien voulu me charger de cette mission et je m'en acquitterai avec joie. Notre cher Maître, qui est absent et fort occupé, n'a pu nous donner la soirée que nous lui demandions, mais il nous a promis de nous satisfaire bientôt.

Veillez, Monsieur, me bien croire votre dévoué serviteur,

MONSIEUR LE PROFESSEUR DONALDSON.

(Signed) EUGÈNE MILLET.

The admiration entertained in this country for Viollet-le-Duc was also shown in the sensation created by a letter which appeared in the *Times* newspaper on the 24th August, 1874, and which referred to his work in connection with the Historical Monuments of France. This letter was subsequently reprinted with other cognate matter in a small volume entitled "On Restoration," and in which the writer (Mr. Charles Wethered, of West Grange, Stroud) enlarged upon his former description, thus :—

"Individually, Viollet-le-Duc is an intellectual king among men, with personal attractions of dignity and grace befitting a descendant of the old noblesse. I have never seen a nobler head or a countenance more expressive of mental power. He comprises in himself the seriousness and solidity of the English character with the *verve* and *esprit* of the French temperament. Most of us, I suppose, accept to the full Carlyle's helpful doctrine of hero worship—of loyal recognition of honoured chiefs in every leading sphere of human thought and action—and here we have a notable living example of the hero as artist, as poet or seer, who speaks to us



for our instruction and delight, not only in the printed volume but in the still more fascinating language of form and colour. . . . No writer, as far as I am aware, has so clearly and philosophically explained the true origin and nature of art as an instructive, emotional force of the mind striving to express itself outwardly in some one of its modes or other—as a product of the imagination regulated by the reasoning faculty; or defined with greater precision its distinctive unity. . . . He enters his studio at seven in the morning, where he is engaged till nine in getting in readiness the work that will be called for, and preparing for his visitors, whom he receives from nine till ten, during which he takes his frugal breakfast standing. At this hour will be found ready the manuscript for the publisher, a pile of wood blocks for the engraver—who has only to follow and cut between the sharp lines of the finished drawings which cover them—plans for the builder, designs for the sculptor and blacksmith, and cartoons for the decorator or glass painter—every one of which is the product of his own hand. For each of his staff as he arrives, after his ‘Voilà, Monsieur, votre affaire,’ and verbal instructions, he has a kind word of friendly inquiry, encouragement, or advice. At ten his studio is closed, and he works at his drawings without interruption until his dinner hour at six. At seven he retires to his library where he is engaged with his literary pursuits till midnight. . . . The thousands who work under him may well look up with sincere admiration and respect to a master who has done so much to extend the beneficent scope of art by bringing it home to the daily lives and aptitudes of a most intelligent class of handicraftsmen. One of his principal *employés* said to us with hearty enthusiasm, ‘He knows everything, from astronomy and geology down to cookery, and it all comes like music from his lips.’ . . .

“As a proof of his remarkable powers, here again is an instance, the truth of which I can vouch for. By the cession of Nice and Savoy, France got possession of a considerable portion of the Alpine region. No maps other than the vaguest and most inaccurate existed of this new territory. At the request of the French Government, Viollet-le-Duc undertook to survey and map it. For this purpose he spent the months of July and August of last year (1874) among the mountains, and there, unaccompanied and unaided, during that short space of time, by means of his observations, sketches and wonderful memory, he made himself so perfectly acquainted with the topography of the whole district that, to use his own words, he knew the ground as well as if he had made it. Within another two months, after his return home, he had drawn to a large scale three accurate and beautiful maps of the French Alps: a *carte à vue d’oiseau*, which shows the mountains, the snows, the glaciers, the rocks and the very moraines, as they would appear to the eye from a balloon; a *carte géologique*, which exhibits the formation of the hills, even to the very crystallization of the rocks; and a *carte routière*, on which is faithfully delineated every track, stream, crevasse, chalet or other object which can guide the tourist, who with this map in hand may find his way alone throughout the mountains. These maps, which have won the warm praise of members of the French Academy and other *savants*, will occupy two of the most expert engravers of Paris at least a score of months to execute in a form for publication worthy of the originals. This is not all. During the evenings of these two months passed in the mountains, he wrote and illustrated one of his smaller books (*Histoire d’une Maison*), in which, under the guise of a story, the architectural student is taught how to build a house solidly and well, at once delightful to look upon and comfortable to dwell in.”

The sixth and final volume of the *Dictionnaire du Mobilier Français* was not completed until 1875. About the same time he published his *Histoire de l’habitation humaine*, a work which, in the opinion of many, has not increased his great reputation for archæological learning and the power of appreciating facts. Prepared in the form of a novel, it was evidently intended for general reading, and for such a purpose it may afford instruction; but the architectural student is likely to be misled by a tale that treats of Greece and Rome in much the same vein as Mazois described a “Palais de Scæurus.” The *Histoire d’une Maison*, though also a tale, is one of a different category—one that, in the words of a competent critic, every student of architecture, of every country, should read and study with care, and in the original French.

Viollet-le-Duc was one of the founders of the École Spéciale d’Architecture in Paris, a school professing views of education of a very liberal character, and the address delivered at the opening of the Session 1879-80, by M. Émile Trélat, the accomplished Director of that School, contained the following passages:—

“L’architecture resta l’étiquette de sa carrière et il y fut maître. Mais l’art, l’histoire, l’archéologie, l’enseignement, l’administration, la géodésie, les questions militaires, la polémique nationale, que sais-je; tout eut place

dans son œuvre. Il fut dessinateur incomparable, constructeur éminent, restaurateur de monuments sans égal, écrivain infatigable, producteur sans repos. On se perd dans le nombre de ses dessins, de ses édifices et de ses écrits. Il faut renoncer à les nommer. Mais il faut citer sa restauration du château de Pierrefonds qui est un chef-d'œuvre, son *Histoire d'une forteresse* qui est une merveille, son *Dictionnaire de l'architecture* qui est une gloire de la France. . . . Si vous voulez vous faire une idée quelque peu juste, messieurs, de la capacité extraordinaire et de l'effrayante activité de Viollet-le-Duc, songez, je vous y engage, que c'est au travers de ces études supérieures et vastes que s'exécutaient les restaurations si nombreuses et si importantes qui lui furent confiées par le Gouvernement. Songez encore que jamais travaux ne furent mieux faits que les siens ; que jamais chantiers ne furent mieux conduits et plus simplement administrés que les siens, et que tous les dessins qu'ils consommaient sortaient de sa propre main. Si vous voulez toucher un des mobiles intimes de la nature morale de Viollet-le-Duc, vous noterez ceci. Il n'avait rien de caché. Tout ce qu'il récoltait, tout ce qu'il faisait, tout ce qu'il croyait appartenait à tous. Aussi, sa porte était-elle grande ouverte tous les jours de huit à dix heures du matin, et chacun trouvait auprès de lui le renseignement parlé, écrit ou dessiné, le conseil ou le document prêté, dont il avait besoin. Il s'est toujours considéré comme le camarade de tous ceux qui travaillent. . . . Il s'est encore mis dans le rang, lorsque la France a réclamé de ses élus l'énorme labeur des reconstitutions administratives, nécessité première de notre relèvement national. Quelle assemblée a eu plus de difficultés à vaincre que le Conseil Municipal de Paris depuis huit ans ? Et quel conseiller parisien a plus travaillé, plus fourni de lui-même, plus éclairé de situations que Viollet-le-Duc ? Et qui de nous n'a la pensée, amère et douce, qu'il est mort pour avoir trop donné sur ce champ de bataille, où il servait la République ? Personne, messieurs, n'avait mieux pénétré l'histoire de son pays que Viollet-le-Duc. Il l'avait fait à sa manière, mais si généralement et si profondément qu'il s'était identifié avec les différentes générations. Il savait nos ancêtres à tous les temps, dans leurs usages, dans leurs mœurs, dans leurs livres, dans leurs parchemins, dans leurs châteaux-forts, dans leurs églises, dans leurs maisons communes, dans leurs habitations, dans leurs mobiliers, dans leurs costumes. Il était historien comme Michelet. Il avait comme lui cette seconde vue qui transperce les événements et les choses. Au lieu de l'éloigner de l'esprit moderne, la possession du passé lui avait fourni la compréhension nette des exigences et des forces de nos sociétés."

The news of his death and of his funeral at Lausanne was received at the Institute a short time before the commencement of the Session just terminated, and Mr. Whichcord alluded in his opening address to the pre-eminence of Viollet-le Duc over all other exponents of the artistic theories and precedents he illustrated. "Both in diagram and description," said the President, "he was unsurpassed. More, he used his natural power of logical deduction to explain methods of construction, or give a reason for forms of design, with strength and ability such as none of his predecessors had exhibited." A few days after his death a writer in *Le Monde Illustré* (M. Victor Champier) touched with a light hand upon one side of the character of Viollet-le-Duc. "Singular thing," he wrote, "this man, mild and affable, so frankly simple, of that adorable simplicity which a truly superior mind alone possesses, had the temper of a disputant (*polémiste*) and an obstinacy, a firmness in his artistic theories, which never for any consideration yielded. He, the most illustrious architect of our time, was not a member of the Institut. Having opposed the doctrines of the Académie des Beaux-Arts, the exclusive instruction of which seemed to him fatal, he refused all concession. Honours to him appeared of small account in comparison with truth. . . . I speak here of the architect only, of the artist only, of the *savant* only. Who, in effect, some years hence, will care about Viollet-le-Duc's political rôle ? Who will trouble to reproach him either for his intimacy with Napoleon III., or his assiduity at the Conseil Municipal of Paris ? Those are wretched quarrels, worthy of the strange epoch in which we live, but which will appear of small importance in presence of the works, numerous (*multiples*) and almost all remarkable, left by the eminent artist whom we have just lost." That the terrible blow which fell upon France in 1870-71 had its effect upon a nature so earnest and determined as that of Viollet-le-Duc may be fairly surmized. If



he did not accept accomplished facts without murmurs he thought and worked with energy and good faith for all the political parties of France. During the siege of Paris he was nobly conspicuous in the efforts for defence; during the Commune he escaped from the Capital to avoid being made a leader and the hero of an hour. His remarkable "*Histoire d'une Forteresse*," written some three or four years after that event, bears on the first page a suggestive motto, which is a quotation from the old French and runs:—"Je sçais bien qu'il faut perdre, qu'il faut gagner, et il n'y a rien d'imprenable; mais desirez cent mil fois plustost la mort, si tous moyens ne vous defaillent, que dire ce mechant et vilain mot: Je la rends." Indeed, it may be asserted, without fear of contradiction, that the health of Viollet-le-Duc was irretrievably impaired by the anarchy and disaster of which he was an indignant witness, and that his end was accelerated by anxiety for the permanent welfare of his country.

THOMAS HENRY WYATT, F.S.A., *Past-President* and *Hon. Secretary*.

WHEN, in 1873, The Royal Gold Medal was presented, by the hands of the late Sir Gilbert Scott, to Thomas Henry Wyatt, the latter, whose death occurred on the 5th of August, 1880, gave his sympathetic colleagues some particulars of his youth. "Like," said he, "one of my predecessors in this honour (Mr. Fergusson), I was intended to be a merchant and spent two or three of my early years in the Mediterranean, trying to learn the beauties of cottons, coffees and calicoes! I utterly failed in the attempt, and then my father sanctioned my trying my hand at that profession which had always been my ambition. I need hardly say that a lengthened journey home through Italy and France confirmed my wishes and aspirations. From the first I felt that if it was not in my power to realize great and meritorious works, it might be in my power to win the confidence and personal regard of my clients, of those who intrusted their interests to my care; I further believed that I might by consistent and honourable conduct also win the approval and good will of my professional brethren. I am thankful to say that in the first of these objects I have fully succeeded, and am proud to feel that, in your award of this Medal, I have not failed in the last."

Wyatt was born in Ireland at Loughlin House, Roscommon, and was the son of Mr. Matthew Wyatt, a Metropolitan Police Magistrate, who died at a comparatively early age. Never articled, his study of architecture began in the office of the late Mr. Philip Hardwick, R.A., about the time when the designs for the Euston Square Terminus of the London and North Western Railway were being made. He early obtained the appointment of District Surveyor for Hackney, but in consequence of the press of other business he retained it only for a short period. That business for more than forty-four years was conducted in Great Russell Street, Bloomsbury, where, at No. 77, he resided at the time of his death. He was a member of the Athenæum Club and its honorary architect; an Associate of the Institution of Civil Engineers, he had a seat at the Council-table as the Honorary Architect of the Institution, and the building in which it is now housed was erected from his designs. He was similarly connected with the Middlesex Hospital and other bodies. He was one of the consulting architects to the Incorporated Society for the building of Churches, and he was appointed as early as May, 1839, architect to the Salisbury Diocesan Church Building Society; he was also

consulting architect to the Commissioners in Lunacy. His connection with the Institute is thus sketched in the *Builder* :—

“Probably very few are aware of the interest with which Mr. Wyatt viewed the formation and progress of that body. When all England was burning hot with Parliamentary Reform, there was just a little sympathetic smouldering and smoking going on among the architects as to the necessity of education, of archæological inquiry and of united action. An institution—called the Architectural Society—then existed, the objects of which were the advancement and diffusion of architectural knowledge, by promoting the intercourse of those engaged in its study. Started in 1831, it was not till 1833 that the members felt the necessity of hearing ‘Papers’ read, and the first of a series of essays read before the Society is now preserved in the library of the Institute. It is the work of Mr. Wyatt—a manuscript written by himself—which treats of: (1) ‘The advantages we may derive from the observance and interchange of our mutual thoughts and acquirements;’ and (2) of ‘The advantages of friendly intercourse amongst the members of a profession deemed polite and liberal.’ Some may smile at the theme, but the spirit breathed in it is that of Tom Wyatt, young, middle-aged, and old; and while the arguments he used still hold good, the complaints he uttered are still unanswered. In his essay he alluded to the superior organization of the French ‘Public Works,’ and of the superior training of the French student of architecture—allusions which, during the remainder of his life, he must have heard others continually repeat with more or less force and with equally just premisses. The Architectural Society, however, gave way to a more important institution, though meanwhile Mr. Wyatt had been its Vice-President, and his great friend Mr. George Mair, its Honorary Secretary. In 1838 the former became a Fellow of the Institute of British Architects, and in 1842 the Architectural Society became a part of the Institute founded, as every architect knows, in 1834, though the charter was not obtained until three years later. In the year of the junction Mr. Wyatt was elected a member of the Council, and of that Council (all distinguished men) only two now survive—Professor Donaldson and Mr. Mair. From that date to this, Mr. Wyatt has been associated with the proceedings of the Institute. Elected President in 1870, his presidential addresses were eminently characteristic and practical expositions not only of the events of the period, but also of past and future circumstances connected with architectural affairs. . . . . As a member of the Corporate Body of British Architects he must be regarded as eminently successful in his professional career; as a member of the Council his advice was sought and his opinion received with respect such as few other members inspired. He was conciliatory and politic; always modest and a gentleman. The words he wrote in 1833, when called upon to prepare the first of a tentative list of essays for the Architectural Society, were not unlike what he often uttered towards the close of his life; and at a time when the test of examination is about to be enforced on all candidates for admittance to the ranks of the only chartered architectural society in Great Britain, those words, after the lapse of half a century almost, may not inappropriately be inserted here :— ‘Gentlemen,’ said Mr. Wyatt, ‘I have wandered far from my subject, and trespassed, I fear, still further on your patience. But I would prove that in the establishment of our society a foundation has been laid upon which may be raised, by our own energy, an Institution alike important to ourselves and to society, though to effect this end sacrifices and efforts of no ordinary nature must be made. There must be the sacrifice of all self-conceited opinions, there must be the entire abandonment of every petty cause of dissatisfaction in our mutual anxiety to promote one common object; there must be the effort made to judge rather less favourably of ourselves and more charitably of others than is perhaps in strict accordance with human nature.’”

The death of Mr. F. P. Cockerell, having caused a vacancy in the important office of Honorary Secretary, Wyatt was elected to it and for some time he attended meetings of the Council, though in consequence of failing health he was seldom able to stay until the Ordinary Meetings in the evening. He resigned office only a few weeks before his death. He was 73 years of age, having been born in 1807, and his body was conveyed to the little church at Weston a village near Basingstoke, a church which was restored and partly rebuilt at his own expense—his sons being the owners of some property in the neighbourhood. His friend Mr. C. H. Gregory, a Past President of the Institution of Civil Engineers, the President of the Institute, and the Secretary, attended the funeral which was of the simplest character, and conducted amid quiet scenery as beautiful as any in Hampshire. Wyatt was one



of twelve architects and sculptors who descend from John Wyatt (born 1675) and Jane Jackson his wife. Their second child (William) was the great-grandfather of the late Sir Digby Wyatt and of the subject of this notice, Thomas Henry Wyatt, whose son (Matthew) is a fellow of the Institute and an architect in actual practice, long associated with his father's business. Their fourth child (Edward) was the great-grandfather of Richard James Wyatt, sculptor, who died in Rome, in 1850. Their sixth child (Benjamin) was the father of Samuel Wyatt, architect, and of James Wyatt, R.A. (Surveyor General, succeeding Sir William Chambers); he was also the grandfather of Jeffry Wyatt (afterwards Sir Jeffry Wyattville), architect, and of Lewis Wyatt, architect. James Wyatt, R.A., before mentioned was the father of Benjamin Deane Wyatt (architect of Apsley House, Sutherland House and Drury Lane Theatre), of Matthew Coates Wyatt, sculptor, and of Philip Wyatt, architect; a son of Matthew Coates Wyatt was also a sculptor, named James Wyatt.

Thomas Henry Wyatt, at the commencement of his professional career, was in partnership with David Brandon, F.S.A., *Member of Council*, and together they designed and carried out a large number of extensive works. The partnership, which commenced in 1838, terminated in 1851; and during that time the well known church at Wilton, near Salisbury, erected at the cost of Mr. Sydney (afterwards Lord) Herbert, was carried out. The extraordinary multitude of works built under Wyatt's superintendence necessarily compelled him to employ a large staff of assistants, and it was his invariable habit to publicly acknowledge the services they rendered to him. The catalogue\* of his works comprizing Hospitals, Mansions, Churches, Schools, Parsonages, Assize Courts, Gaols and Markets, is a stupendous summary of professional practice carried on during the space of a generation in all parts of the United Kingdom.

His younger brother, the late Sir Matthew Digby Wyatt was a pupil in his office, and after Sir Digby's death, Thomas Henry Wyatt presented his brother's portrait, a very excellent likeness painted by Mr. Ossani, to the Institute. He was also largely instrumental, as the President of the Architects' Benevolent Society, in increasing the funded property of that Society, and in improving the business and character of its administration. By his will he has bequeathed sums of money to the Architects' Benevolent Society and to the Library of the Institute.†

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CHARLES JAMES ADAMS, *Fellow*, was elected an Associate in 1864, and a Fellow in 1870. His death was announced at the Ordinary Meeting held on the 24th February, 1879. Sometime Honorary Secretary of the Architectural Association (Lond.), he had been settled for about fifteen years at Stockton-on-Tees, and he carried out a large number of public and private works in the North of England.

HORACE FIELD, *Associate*, was elected in 1854. He was District Surveyor of Putney

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\* See the *Builder*, 14th August, 1880.

† Besides his Presidential Addresses Mr. T. H. Wyatt contributed several Papers, some of which are preserved in MS. and others are printed in the *TRANSACTIONS*. The volume for 1873-74 contains, pp. 157-166, a description by him of the Old Hall and new Assize Courts at Winchester, and that for 1876-77 a Memoir by him of the late T. Talbot Bury, F.S.A., *Vice-President*.

and Roehampton, and he erected several buildings in the Metropolis. His death occurred in May, 1879.

CHARLES AUGUSTUS GOULD, *Associate*, was elected in 1879, and his decease was announced at the meeting of the Institute on the 12th January, 1880. He held the appointment of District Surveyor for East Hackney (South).

JOHN HENRY HAKEWILL, *Fellow*, was elected, with several other Members of the Architectural Society, in 1842, but resigning in 1848 he was re-elected in 1854, and the same year was made a Member of Council. His term of office expired he continued to interest himself in the affairs of the Institute. He was a second time elected on the Council in 1862, and again in 1869. He was the architect of churches, parsonages and schools in Suffolk, Essex, Wiltshire and other counties. Among the mansions he designed and carried out may be named Howbury, near Wallingford; Boulney Court, near Henley; and Stowlangtoffe Hall, near Bury St. Edmunds. In London his principal works are the Rectory, St. James's, Westminster; the Boy's School, Marylebone; and a Church at South Kensington. He was one of the Consulting Architects to the Incorporated Society for the building of Churches, and one of the founders of the Architects' Benevolent Society. He died on the 30th August, 1880, in the seventieth year of his age.

ROBERT HESKETH, *Fellow*, was elected in 1849, never having been enrolled in the junior grade. He sat on the Council in 1853-54, and for many years was a constant attendant at the meetings of the Institute. He first studied under Augustus Pugin, and was a pupil of the late Mr. Philip Hardwick, R.A. After his articles expired he joined Sir Charles Fellows in a tour to Rome, where he wintered, travelling thence to Smyrna and other parts of Asia Minor. Returning to England in 1840, he commenced practice in London, and in 1842 was appointed District Surveyor for Bermondsey. He was Surveyor to the Portman Estate, and resigned the appointment after having held it for a few years. He was also Surveyor to the London Assurance Corporation. In 1868 he became Surveyor to the Worshipful Company of Goldsmiths, and retained the appointment until his death, which occurred at the age of 63, in April, 1880. Among his works may be named Acton Church, just completed. He also restored Hampstead Church; and numerous schools, notably those in Milford Lane, Golden Lane, Bermondsey and Knightsbridge, were erected from his designs, as well as the St. Clement Danes Almshouses, and the Houseless Poor Asylum in Banner Street. The President (Mr. John Whichcord) writes "that though of late years Mr. Hesketh confined his attention to the duties of his official position at the Goldsmiths' Hall, he was frequently consulted in contested cases of 'Light and Air,' in which his careful investigation of facts and unquestioned integrity of purpose had great weight with the judges of the Equity Courts. Mr. Hesketh," continues the President, "was a highly accomplished mathematician, a proficient in the science and execution of music, and a genial, happy companion who will long be regretted by a large circle of friends."

THOMAS KESTEVEN HILL, *Fellow*, was elected an Associate in 1869, and a Fellow in 1878. On the death of Mr. Roumieu he entered into partnership with the son of that gentleman, J. P. St. Aubyn Roumieu, *Associate*. His death occurred at the beginning of the year 1879.

AUGUSTUS FREDERICK LIVESAY, *Fellow*, was elected in 1866, never having been



an Associate. He was the last surviving son of the late Mr. John Livesay, for many years Professor of Mathematics and Drawing at the Royal Naval College, Portsmouth Dockyard; he was educated at Caen, in France, and was articled to Mr. James Adams, a pupil of Sir John Soane. Mr. Livesay did much useful work for Ventnor, having projected the Railway from Ryde, and about thirty years ago established, as a private speculation, gas-works and waterworks for supplying the town of Bonchurch. He died at Ventnor on the 24th September, 1879.

GEORGE WILLIAM MAYHEW, *Fellow*, was elected in 1859, never having been an Associate. He was the second son of the late Mr. James Gray Mayhew, who for many years was the District Surveyor of St. James's, Westminster, and Surveyor to the Westminster Fire Office. He was articled to the late Mr. Finden. In 1858, his brother, the late Mr. Charles Mayhew, retired from business. George, having before this practised independently, succeeded to his brother's practice, and in partnership with C. J. Knight, *Associate*, designed and carried out a large number of residences, as well as business premises. Messrs. Mayhew and Knight were the architects engaged in the rebuilding of Hill's Place, Oxford Street, of Messrs. Hooper's premises in Victoria Street, and in extensive alterations to the Messrs. Robinson's, the Messrs. Jay's and other similar buildings near Oxford Circus. Mr. George Mayhew died on the 23rd January, 1880, having completed sixty-two years of existence, less one day.



## NOTE.—GOVERNMENT REGULATIONS RESPECTING STEEL.\*

## ADMIRALTY.

"INSTRUCTIONS FOR TREATMENT OF MILD STEEL.—(1) All plates or bars which can be bent *cold*, are to be so treated; and if the whole length cannot be bent cold, heating is to be had recourse to over as little length as possible. (2) All plates or bars which have been heated for bending or flanging are to be *annealed* afterwards over the parts which have been heated. If it is inconvenient to perform the operation of annealing at one time for the whole of a plate or bar, portions of the length may be annealed separately. (3) If desired, exceptionally long or quickly curved bars, such as frames, may be formed of shorter pieces with the butts suitably shifted and strapped. (4) No bar or plate which shows signs of failure or fracture in working should be put into a ship; but pieces should be cut from such plates and bars, and subjected to quenching and tensile tests. The details of the failures, with particulars of the subsequent tests, should be forwarded to the Admiralty. (5) It is not necessary to anneal plates or bars after punching as a means of making good damage done in punching. All *butt-straps* to plating which forms an important feature in the general structural strength, such as the outer bottom plating, deck plating, deck stringers, &c., should have the holes drilled or be annealed after the holes are punched. In outer bottom plating, the holes, which are to be countersunk, should be punched about  $\frac{1}{8}$ -in. less in diameter than the rivets which are used, the enlargement of the holes being made in the countersinking, which should in all cases be carried through the whole thickness of the plates. (6) Snap riveting is only to be employed for the internal work on transverse bulkheads, floors, framing and other subordinate parts of the structure, but on stringers, deck plating and other parts subjected to considerable tensile strain, countersunk riveting is to be used, and the holes treated similarly to those in the outside plating. (7) It is important that the whole surface of the bottom plating should be thoroughly cleared of the scale formed in manufacture before any paint or composition is put upon it."—*Admiralty*, 26th November, 1878.

"TESTS FOR PLATE, BEAM, ANGLE, BULB AND BAR STEEL, USED IN BUILDING SHIPS FOR HER MAJESTY'S NAVY.—Strips cut lengthwise or crosswise to have an ultimate tensile strength of not less than 26, and not exceeding 30 tons per square inch of section, with an elongation of 20 per cent. in a length of 8 inches. The Beam, Angle, Bulb and Bar Steel to stand such forge tests, both hot and cold, as may be sufficient, in the opinion of the receiving officer, to prove soundness of material and fitness for the service. Strips cut crosswise or lengthwise  $1\frac{1}{2}$  inches wide, heated uniformly to a low cherry red and cooled in water of 82° Fahrenheit, must stand bending in a press to a curve of which the inner radius is one and a half times the thickness of the steel tested. The strips are all to be cut in a planing machine, and to have the sharp edges taken off. The ductility of every Plate, Beam, Angle, &c. is to be ascertained by the application of one or both of these tests to the shearings, or by bending them cold by the hammer. All Steel to be free from lamination and injurious surface defects. One Plate, Beam, or Angle, &c. to be taken for testing from every invoice, provided the number of Plates, Beams, or Angles, &c. does not exceed fifty. If above that number, one for every additional fifty or portion of fifty. Steel may be received or rejected without a trial of every thickness on the invoice. The pieces of Plate, Beam, or Angle, &c. cut out for testing are to be of parallel width from end to end, or for at least eight inches of length. Plates may be ordered either by weight per superficial foot or by thickness. In the former case, the weight named will always be the greatest that will be allowed, and a latitude of 5 per cent. below this will be allowed for rolling in Plates of  $\frac{1}{2}$  an inch in thickness and upwards, and 10 per cent. in thinner Plates. When the Plates are ordered by thickness, their weight is to be estimated at the rate of 40 pounds per square foot for Plates of one inch thick, and in proportion for Plates of all other thicknesses. In this case also the weight due to the thickness by this calculation is not to be exceeded, but the same latitude as above will be allowed below the weight for rolling. The average weight per foot of the Plates ordered is to be ascertained by weighing not less than 10 tons at a time when larger parcels than 10 tons are delivered; if these 10 tons exceed the due weight (calculated as stated above), or are more than the beforementioned percentage

\* See Paper VIII.—"Mild Steel and its applications to Building purposes," by Professor Alex. B. W. Kennedy, M. Inst. C.E., pp. 162-72, *ante*.



below it, the whole may be rejected. In smaller deliveries than 10 tons the average is to be ascertained by weighing the whole parcel. The same conditions as to latitude and mode of ascertaining weight apply also to other descriptions of Steel in the Contract."—*Admiralty, 9th January, 1879.*

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"The Engineer responsible for any steel structure should forward to the Board of Trade a certificate to the effect that the steel employed is either cast steel or steel made by some process of fusion subsequently rolled or hammered, and of a quality possessing considerable toughness and ductility, together with a statement of all the tests to which it has been subjected."—*Railway Department, October, 1877.*



J. P. Seddon.

C. F. Kell, Chromo. litho.

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SUGGESTED DECORATION.





ROYAL INSTITUTE OF BRITISH ARCHITECTS.

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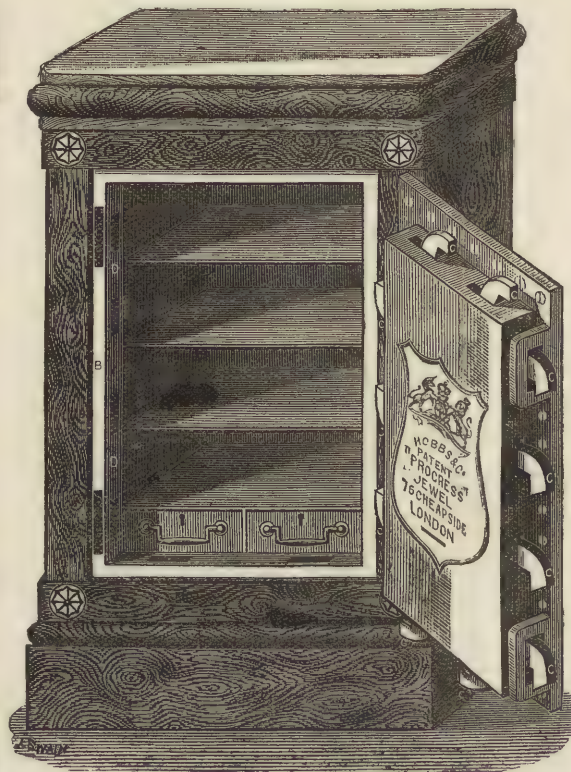
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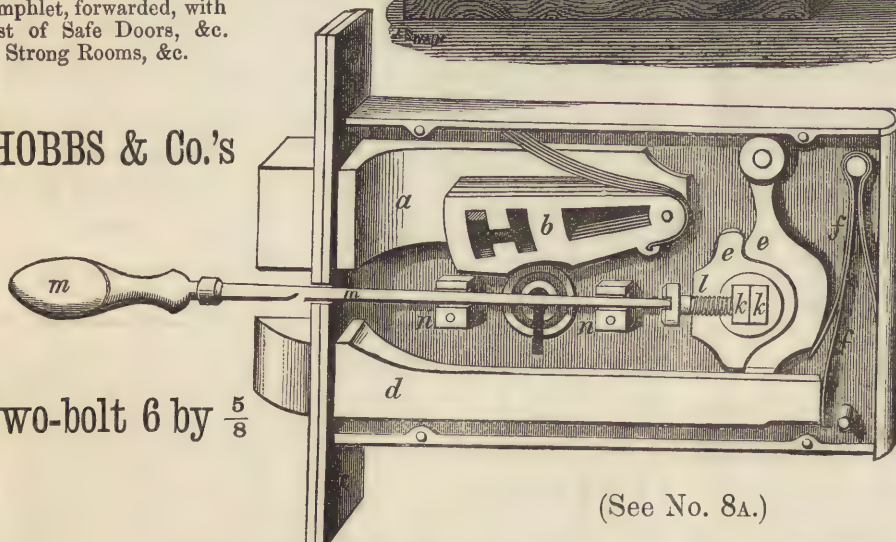
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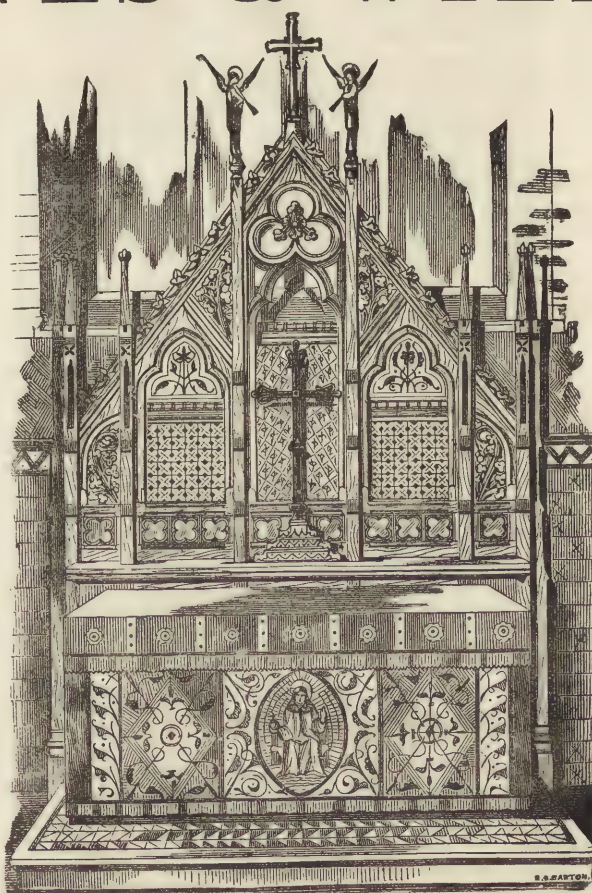
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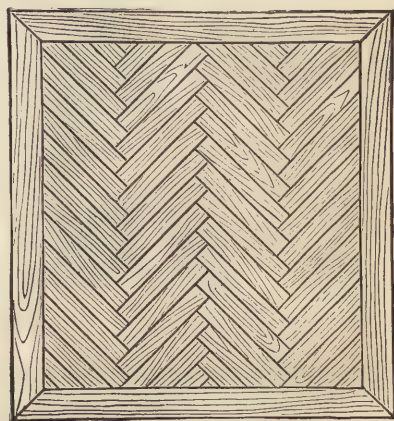
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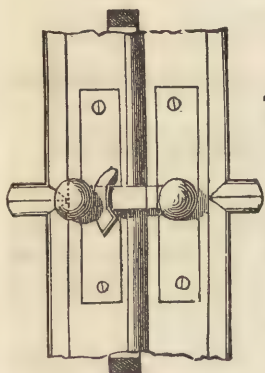
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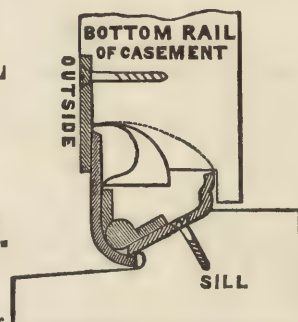
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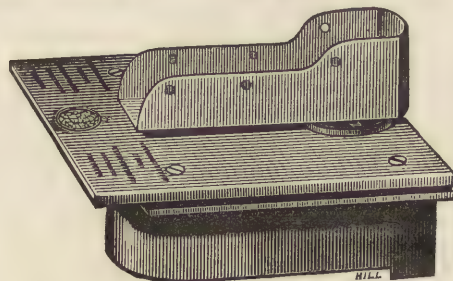
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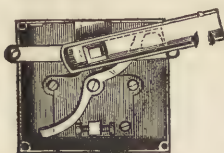
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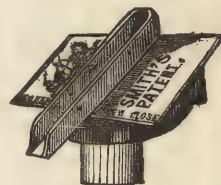
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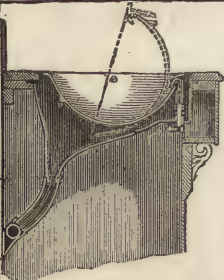
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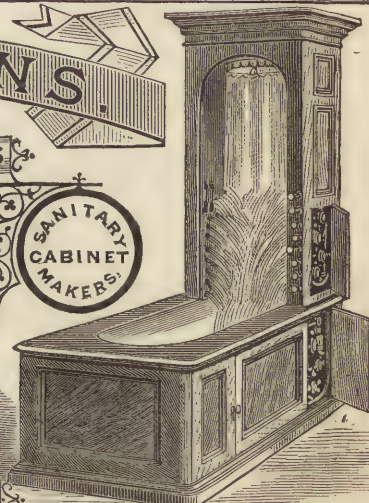
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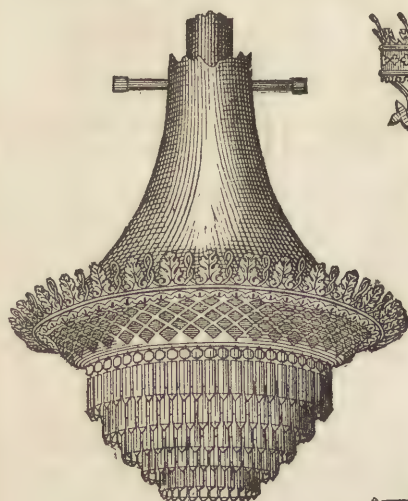
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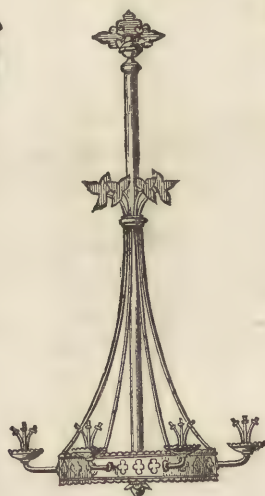
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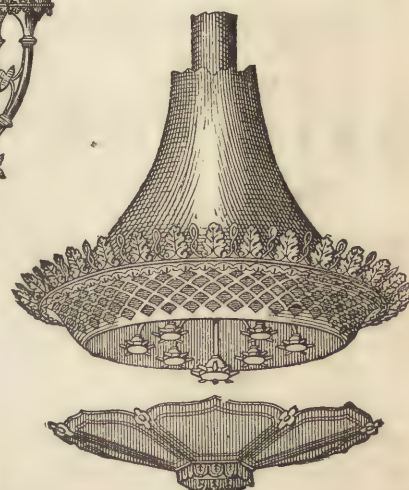
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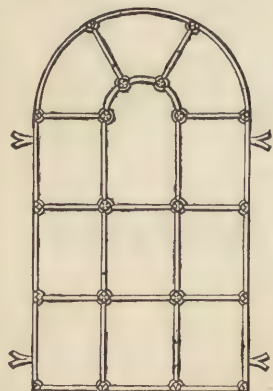
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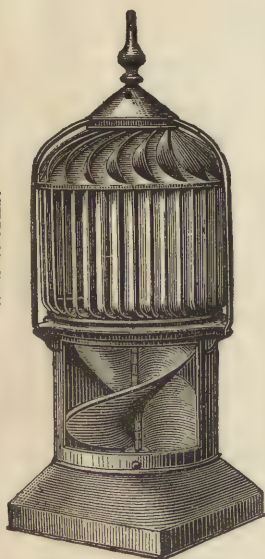
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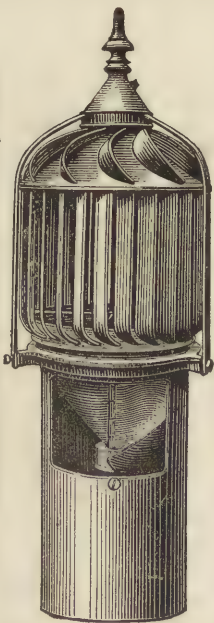
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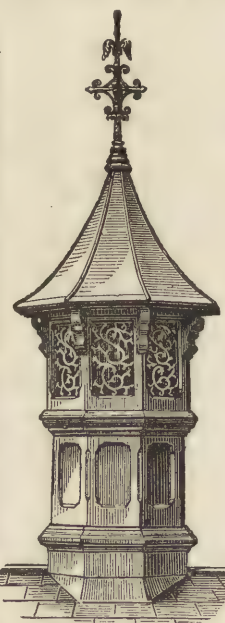
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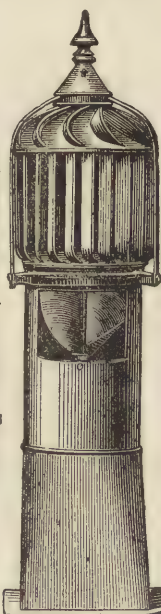
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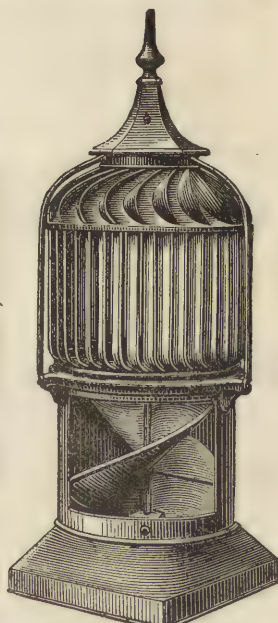
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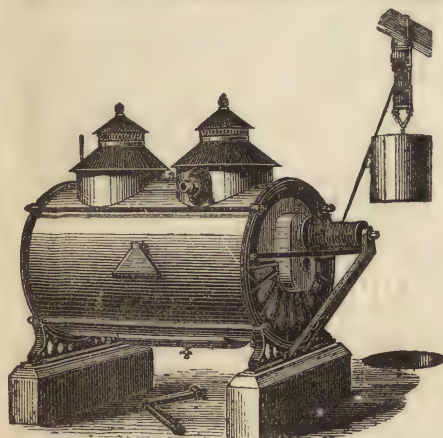
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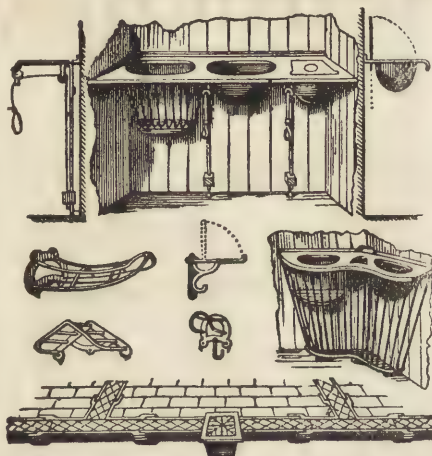
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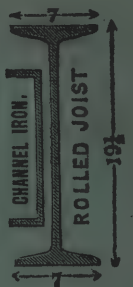


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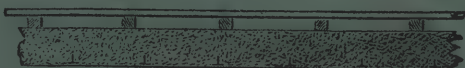
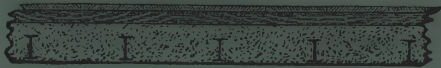
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